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Instructional Practices In Athletic Training Education Programs: 'what

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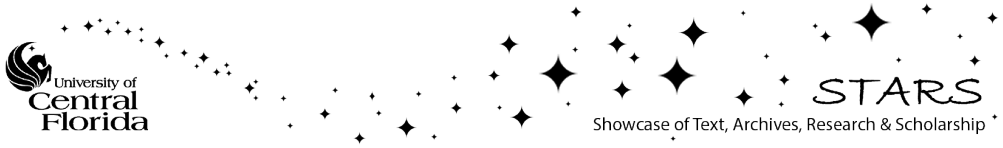

INSTRUCTIONAL PRACTICES IN ATHLETIC TRAINING EDUCATION PROGRAMS: "WHAT METHODS ARE OF MOST WORTH?"

by

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ABSTRACT

This study sought to understand effective and ineffective instructional practices in clinical settings and to identify problem-solving strategies used by students and instructors. Three research questions were addressed: where in the undergraduate athletic training education program do students learn, or fail to learn, particular skills; "what instructional methods are of most worth" in teaching these skills, as perceived by the students; and what are the problem-solving strategies used by novice, experienced non-expert, and expert athletic trainers when confronted with novel situations. The subjects were nine students ("novices") and ten Approved Clinical Instructors (ACI's) from three programs in the Southeast United States. Five ACI's were categorized as "experienced non-experts" and five as "experts". All subjects were videotaped while performing various tasks. Each subject was required to think-aloud while they performed typical tasks expected of an entry-level certified athletic trainer, as designated by the NATA Education Council. Subjects then performed a stimulated-recall session, with analysis adapted from Ericsson and Simon (1993).

The main findings of this study supported the well-respected teaching notion of "first teach them, then show them, then have them do it". Most concepts were first taught via lecture in the classroom; however, participants believed the "method of most worth" to be hands-on strategies displayed in clinical settings and labs. This study confirmed and disconfirmed aspects of prior research on problem solving. Experts: offered the most verbal comments, used their self-talk to stay on task, displayed intimate rapport with the models, and used various problem-solving strategies based upon the task at hand. Experienced non-experts: tended to drift in their verbal comments, felt the need to justify their answers, spoke mostly with verbal commands, and

used several problem solving strategies. Novices: provided the fewest verbal comments, apologized throughout their sessions, often found the problem statement to be the problem itself, and used basic problem solving strategies. Demographics revealed that close relationships, balanced with manageable ACI's and clinical sites, created the most successful programs. Based on the findings of this study, future research must focus on how to best design the curriculum to take advantage of these "methods of most worth".

I dedicate this to my family and loved ones. The hard work, effort and hours put into this document can in no way compare to the sacrifices that you have made for me during this journey. Because of your role in my life, I am so richly blessed. Because of you, I have been afforded the opportunity to grow and develop personally and professionally in ways I could never have imagined. You have loved me, believed in me, supported me, encouraged me, motivated me, and celebrated me. Thankfully, you have shown me by your examples that my purpose here is not about me; that my walk here is much larger than I am. Your daily lives have allowed me to truly understand that to whom much is given, much is expected. I pray that through your unfailing belief in me, that I will in turn continue this amazing legacy and always strive to positively impact the lives of those who are entrusted to me.

A walk imbedded in love can never go wrong. Thank you all for your love and for allowing me to love in return. And thank you, God, for the ultimate love, without which I am nothing. “Now these three remain: faith, hope and love. But the greatest of these is love.”

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Thank you to the three athletic training education programs for allowing me to use your students and ACI's. I could not have done this without you. And to all the athletic training students who have touched my life these past 15 years; it is *you* who truly taught me.

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LIST OF ACRONYMS/ABBREVIATIONS

ACI	Approved Clinical Instructor
ACL	Anterior Cruciate Ligament
ATC	Certified Athletic Trainer
CAAHEP	Commission on Accreditation of Allied Health Education Programs
ENE	Experienced Non-Expert
NATA	National Athletic Trainers' Association
NATA BOC	National Athletic Trainer's Association Board of Certification
PI	Principal Investigator
VSR	Video-Stimulated Recall

CHAPTER ONE
INTRODUCTION

Background and Significance

Athletic training education has progressed in many ways in recent years. Internship programs have given way to accredited programs. Hours-based curriculum have rescinded to competency-based curriculum. Opportunities for clinical experience and professional growth are unfolding daily. However, in light of this period of growth and expansion, Craig (2003b) noted that further growth and reform in athletic training education is still warranted. Even though there have been numerous changes, many things continue to remain stagnant. Looking at the research in this field, it seems that the areas with the greatest potential to impact our profession and our constituents are the areas that have remained unchanged. Rushton and Lindsay (2003) stated that there is a paucity of research in the actual clinical education experience. Weidner and Henning (2002) furthered this and stated that there is a dire need to infuse quality clinical instruction into the athletic training programs. Cummings (2004) posed the need to design clinical experiences to help promote optimum learning. While prior research in the field has identified some of the important variables at play in the educational experience, still left are important questions about what students are learning in their clinical experiences and understanding the programmatic and instructional impediments to improving the educational experiences for these students (Cummings & Boote, 2003). The overarching question asked by many athletic training educators remains: where and how is the disconnect between classroom teaching and clinical instruction occurring?

Institutions of higher learning are held accountable for the successful preparation of students and their transition as productive new members entering the workforce (Erickson & Martin, 2000). Elliot Eisner (2002) noted that a cloud of uncertainty surrounds American education. The inability of students to properly employ problem solving skills and thinking strategies has created concern (Nickerson, 1994). Health care professions are not exempt from this sense of accountability. The recent transformation in the delivery of healthcare services has yet to equate to any changes in the education of these healthcare workers (Tucker, et al., 2003). Unfortunately, we find athletic training floundering in the midst of this anomaly trying to define its own sense of educational quality (Peer & Rakich, 2000). Knowing that higher education appears to be in a state of distress, the conundrum remains that the *student* is the product of education and our best representation of the future (Fuller, 1997). It becomes paramount, then, to design educational programs with sound pedagogical and instructional principles that properly prepare these students to best perform the jobs they are graduating into.

At the heart of all health care professions is the clinical education component. The National Athletic Trainers' Association Education Council has proclaimed clinical education as a foreboding issue needing to be addressed by the profession (Curtis, Helion, & Domsohn, 1998; Starkey, 1997). A structured emphasis on clinical education is prevalent in nursing (Gross, Aysse, & Tracey, 1993), family medicine (Kowlowitz, Slatt, Kollisch, & Strayhorn, 1996), internal medicine (Gruppen, Wisdom, Anderson, & Woolliscroft, 1993), occupational therapy (Derdall & Urbanowski, 1995), physiotherapy (Harris & Naylor, 1992), as well as in athletic training education programs (Curtis, et al., 1998; Weidner & Henning, 2002). Clinical education is deemed to be one of, if not the most, critical aspects of health care education programs (Platt Meyer, 2002; Weidner & Henning, 2002). The clinical education setting aspires to serve several

purposes including the reinforcement of didactic content (i.e. clinical competencies and proficiencies) taught in classrooms (Laurent & Weidner, 2001) and the maturation of students into professional practitioners who demonstrate skill sets appropriate for their work environment (Weidner & Laurent, 2001). Most importantly, the clinical experience has the potential to both reflect the quality of the educational program (Erickson & Martin, 2000) and provide an optimum environment that is conducive to learning (Swann, 2002). With so much at stake in the clinical education setting, it is becoming more apparent that instructional and assessment strategies have not been designed with a sense of importance to enhance these learning opportunities.

An exciting reality in athletic training education is that reform is still currently underway (Denegar, 1997; Denegar & Hertel, 2002). The inability of University based athletic training education programs to control their students' clinical experiences (Peer & Rakich, 2000) and the need to guarantee effective clinical instruction (Platt Meyer, 2002) have recently brought about the desire to appropriately design clinical experiences that bridge didactic knowledge and practical skills (Swann, 2002). In light of these insights, curricular changes that focus specifically on the instructional practices in clinical settings are still desperately needed in the undergraduate athletic training programs.

Definitions

Lachman's Test – a physical exam used to identify laxities of the anterior cruciate ligament in the knee.

Learning Unit – a concept or unit that, combined with others or by itself, comprises a larger task. For example, hand position, anatomical landmarks, and knowledge of test outcomes are all potential learning units that could be identified within the Lachman's Test.

Novel Situations – a task or situation that the subject has had no prior knowledge of its' inclusion in the study.

Problem Solving Strategies – the process by which each subject attempts to identify and address solutions to problems and/or tasks in this study.

Statement of the Problem

The athletic training educational competencies and clinical proficiencies have been identified as essential for entry-level athletic trainers to be able to perform by the National Athletic Trainers' Association Education Council (Athletic Training Educational Competencies, 1999). These competencies and proficiencies are a required component of every undergraduate athletic training program that is accredited by the Commission of Accreditation of Allied Health Education Programs (CAAHEP). Further, the National Athletic Trainers' Association (NATA) stated that the education for athletic training students should be driven by these competencies. Clinical education, the experiential component of athletic training education, should specifically employ the use of the clinical proficiencies that stem from the competencies, with a two-fold purpose: to delineate that common skill base that all entry-level athletic trainers must be able to display, and to assist program directors in structuring the clinical experiences for athletic training students. The assumption now exists that the curriculum reflects a sense of direction in the instructional methods that instructors use in their classrooms and in the clinical settings.

Little emphasis has been placed on curriculum design and instructional practices (Danielson, 2002; Palmer, 2002; Osternig, 1998). In fact, Harrelson, Leaver-Dunn, & Martin (2003) as well as Cummings (in press) noted that the instructors in athletic training education programs appear to be employing instructional practices that are not appropriate for the chosen settings. The current curricular experiences and teaching practices of instructors do not ensure that students are learning the requisite knowledge during the undergraduate athletic training experience. This void in curricular leadership needs to be addressed.

As Eisner (2002) so eloquently stated, the educational journey should be one that is not only successful for all parties involved, but one that is a journey in which students want to embark upon. Students represent our future (Sternberg, 2003). Developing a curriculum that both entices the student and properly prepares the student is of utmost concern.

Herbert Spencer is credited with coining a phrase that resounds loudly in this setting: "What knowledge is of most worth?" From this, Michael Apple massaged Spencer's message and crafted it poignantly for his time. He penned the perennial question, "Whose knowledge is of most worth?" Slavin (2004) very recently crafted his version of the "what works" mission. He charged that all "what works" questions in education must be answered via well-founded research studies. In following my predecessors, I claim that we retool Spencer's, Apple's and Slavin's famous words and create the charge for athletic training education: "What instructional methods are of most worth?" The purpose of this study was to better understand the instructional practices being used in clinical education settings as well as identify problem-solving strategies used by the students and instructors in undergraduate athletic training education programs.

Research Questions

The research questions asked in this study were:

1. where in the undergraduate athletic training education program do students learn, or fail to learn, particular skills,
2. "what instructional methods are of most worth" in teaching these skills, as perceived by the students, and
3. what are the problem-solving strategies used by novice, experienced non-experts, and expert athletic trainers when confronted with novel situations.

Initially, this study started with two research questions. Questions one and two above were combined into one question, asking both where do the students learn and/or fail to learn while also asking "what instructional methods are of most worth" in teaching these skills. After extensive review and deliberation, the three questions emerged as stated above. The original two questions were parallel to the current three; however, they were modified to add clarity and emphasis to the direction of this study. All three questions merit review and discussion.

Limitations

1. Sampling for this study was purposeful, thus limiting the generalizability of the information gathered. However, purposeful sampling allowed the researcher to best depict, in great detail, the specific occurrences that were studied. This rich information can then be presented to the larger group with the eye of interpretation resting on them. Also, even though the sample size is appropriate for qualitative research, the sample size could be criticized as not

being all-inclusive. Gass and Mackey (2000) noted that there is no research methodology that exists that is without some form of limitation.

2. Think aloud protocols do not require the analysis of "how" processes were determined or "why" certain things were chosen (Ericsson & Simon, 1993). Think aloud protocols provide a snapshot view of a particular situation at that moment in time. This issue alone leaves room for some to potentially question the study outcomes. Since the purpose of this study is to better understand a dynamic educational environment, the methods were chosen to provide the richest, most detailed version of the story at hand.

3. Pitney (2004) also revealed yet another potential limitation. Qualitative research looks to understand the depth of a phenomenon, not the all-encompassing breadth of it. Transferability to others and other settings, not generalization, is the aim. Being able to produce findings that are meaningful and practical to others is the best indicator of credibility in qualitative research. It is, therefore, left to the researcher to ensure that the whole of the story is told in a manner that allows the possibility for the reader to fully understand and apply the findings to their individual settings.

Assumptions

Several assumptions existed in this study:

1. The novices would be able to remember where in their educational program they were taught specific skills and information;
2. The subjects would be able to perform in a "think-aloud" fashion without detracting from the performance of the tasks; and

3. The subjects would be able to understand that the emphasis in the think-aloud protocol is on the verbalization of any and all thoughts, not on the explanation or justification of their actions.

Methodology

This study was a qualitative study using a think-aloud protocol with video-stimulated recall methodology. Three sites were chosen in the Southeast United States to collect data. These sites were chosen based on location, subject availability, and willingness to participate in the study. Subjects were purposefully chosen by the Program Directors, again based upon availability. Nine students (novices) were selected for this study. Ten Approved Clinical Instructors (ACI's) were also chosen by the Program Directors and were categorized based on their length of duty within the profession. Five ACI's were designated as experienced non-experts because they had been practicing less than ten years as certified athletic trainers. The remaining five ACI's were designated as experts; they had been practicing athletic training for over ten years.

All subjects were videotaped performing two sample tasks and four main tasks. These tasks were designed to be progressively challenging in nature. The two sample tasks were used to familiarize the subjects to the study design. Each task required that the subject think-aloud while they performed the tasks on a model or on a blackboard. Appropriate supplies were on hand to facilitate completion of each task. After the videotaping of the tasks was completed, subjects performed a stimulated-recall session. Here, they were instructed to pay attention to their verbal

comments. Upon hearing their verbal comments to each task, subjects were asked to identify specific learning units, if appropriate, for each task.

From the learning units described by the novices, research questions number one and two were answered. The interviews were then transcribed, coded and analyzed. Problem-solving strategies of each subject group emerged and were identified.

Data Analysis

The data was analyzed from several viewpoints. Analysis began with the program demographics. Program history and student demographics were incorporated with the other data to permit a greater understanding of this phenomenon. The stimulated video recall was analyzed next. Verbalizations were coded based on themes that emerged from the review of literature and during the interview transcriptions. Identifying learning units, and thus instructional strategies, was the first step utilized in attempting to understand this data. In processing the novices' responses, an idea of where and when specific learning occurred evolved. Also, the responses surrounding the instructional methods that were being used and their perceived effectiveness helped to determine the instructional methods that were deemed to be "of most worth" to these subjects. Common trends and themes emerged in the problem-solving strategies of the novices, experienced non-experts, and the experts as well as differences came forth between these groups.

Summary

Many studies have been done over the years looking at undergraduate athletic training programs. Few studies have actually undertaken the challenge of identifying instructional concerns within these programs. Anecdotally, athletic training educators know that something is missing; that there remains a secret ingredient in best teaching students in the various clinical settings used to educate and professionally prepare students. This qualitative study set forth to uncover the secret, to bring to light the "method of most worth" for these students. By using a video-stimulated recall format with think-aloud protocols this, as well as identifying problem solving strategies between novice, experienced non-expert and expert athletic trainers, was addressed.

CHAPTER TWO
LITERATURE REVIEW

Undertaking an endeavor such as this study, that transcends so many disciplines, required an extensive review of the literature. Organizing the wealth of information that was uncovered became quite a challenge. This chapter was organized from the most general educational topics to the specific strategies and methodologies used in this study. First, a broad overview of educational research was described followed by research in athletic training. Then, a review of the research regarding specific components of athletic training education programs set the stage for findings on video-stimulated recall, problem solving strategies, think-aloud protocols, and finally expert-novice studies. A summary at the end of this chapter is offered to help capture the importance of these works and bring them into focus for the remaining chapters.

Educational Research

So often, when one thinks of educational reform, thoughts of elementary schools, science and math curriculums, and various other aspects of public education come to mind. However, there is now, and has been, a wave of reform washing over American higher education (Eisner, 1971b; Slavin, 2002). Eisner (1971b) foresaw this many years ago, writing about the social, educational and curricular crisis facing this country even then. Recently, Slavin (2002) pointed out that we are sitting on the edge of a major paradigm shift that has the potential to change the face of education, as we know it. Every facet of education should and will be touched. Research in education must continue in order to properly identify these changes and meet the needs of the students wherever they are.

Nickerson (1994) noted the importance and need for continued improvement in higher education. He found of great interest, in 1991, that the U.S. Department of Educations' National Educational Goals Panel mandated improvement in critical thinking abilities and problem-solving skills in college students. This was to have occurred by the year 2000. Slavin (2002) extended his concern about this ongoing improvement process. He demanded that proven methods be used in the schools. These methods must be implemented and then assessed to determine their levels of effectiveness and worth. We have to know that what we are doing actually works.

Ultimately, educational research needs to be done to improve upon something – to positively impact the lives and learning experiences of the students we teach. Slavin (2002) agreed with this and stated simply that research in education has to tap into the betterment of the students' outcomes. He said that educators who truly want to can do this by applying evidence-based educational research into their classrooms. As educators, we are not only expected to teach and instruct. We are expected to hold ourselves accountable for the consequences of our instruction, both good and bad (Eisner, 1971b). In a nutshell, educators are bound to dedicate themselves to discovering "what works" (Slavin, 2004); translated here, "what instructional methods are of most worth".

Athletic Training Education

The goal of athletic training education, like that of medical education (Long, 2000), is to properly prepare a student to be competent in his or her chosen field (Erickson &

Martin, 2000; Role Delineation Study, 1999). Numerous things can be used to distinguish whether or not competence has been achieved. Individuals capable of problem solving (Hunt, 1994; Walker, 2001) are most frequently cited as having attained a certain level of competence. The ability of the athletic training education program to effectively produce competent individuals is critically important to the success of the profession (Brower, Stemmans, Ingersoll, & Langley, 2001). Thus, it becomes obvious that this should be the norm and not the exception as evidenced in the athletic training educational goals and instructional strategies.

Currently athletic training education programs are facing reform on many fronts, with clinical education being one area of great concern (Craig, 2003b; Denegar & Hertel, 2002). Swann (2002) noted that providing quality clinical education continues to be a challenge for athletic training educators. Denegar and Hertel (2002) confided that all components of the athletic training education programs could stand a second glance. Cummings (2004) and Cummings and Boote (2003) revealed that the intended curriculum in undergraduate athletic training programs was not the actual curriculum – in fact, students were not learning what the education programs thought they were. Prior to these findings, the illusion existed that increased academic control and accountability of the educational programs was on the horizon (Peer & Rakich, 2000).

Previous research in athletic training education programs has documented problems manifest in the athletic training educational experience. Leaders in the field have identified the glaring need for instructional reform (Cummings & Boote, 2003; Denegar, 1997; Harrelson, Leaver-Dunn, & Wright, 1998; Weidner & Laurent, 2001). Other frontrunners have focused their research on the instruction provided by the certified athletic trainers (ATC's) supervising the student athletic trainers (Anderson, Larson, & Luebe, 1997; Foster & Leslie, 1992; Laurent &

Weidner, 2001; Osternig, 1988) and others have emphasized the learning styles of the student athletic trainers (Coker, 2000; Harrelson, Leaver-Dunn, & Wright, 1998). Even still, the often-misunderstood role of the clinical instructor was studied by many (Derdall & Urbanowski, 1995; Erickson & Martin, 2000; Harrelson, Gallaspy, Knight, & Leaver-Dunn, 1997). Cummings and Boote (2003) brought forth the reality that it was not until the very recent past that curriculum issues in athletic training education began to receive their proper place in the research arena. Prior to their studies, instructional and pedagogical issues in athletic training educational programs had been scarcely addressed.

Haidet, O'Malley and Richards (2002) found that medical education, in general, is also facing an onslaught of reform issues. These issues are centered on the need to improve medical pedagogy and learning outcomes. Instructional strategies are seen as key components in turning this situation around. Instruction is what most effectively reaches and prepares potential health care professionals to meet the demands of their jobs. Patel, Glaser, and Arocha (2000) understood that with the complexity of medicine, comes an even greater challenge in addressing the pedagogical and instructional concerns in this setting. Because of that, they strongly felt that there will not be one, but several approaches that arise as possible solutions to the instructional and pedagogical issues that medical education in general is facing today. By borrowing expertise and wisdom from our neighbors within other medical education programs, it behooves us to hone in on the fact that research into pedagogy and instructional strategies in undergraduate athletic training education programs could greatly improve the quandary we now find ourselves in.

Clinical Education

Clinical education in the athletic training programs is comprised of numerous laboratory and/or clinical experiences and the senior year field experience (National Athletic Trainers' Association Education Council, 2004). The clinical experiences are a necessary component of the undergraduate athletic training education programs (Berry, Miller & Berry, 2004; Curtis, Helion & Domsohn, 1998; Jacobs, 2001). Laurent (2000) noted that professional development of novice certified athletic trainers came mostly (53%) from their clinical education experiences. Clinical education strives to provide an atmosphere that can marry the didactic classroom knowledge with experiential opportunities that will transfer into the clinical settings (Berry, Miller & Berry, 2004; Coker, 2000; Laurent & Weidner, 2001; National Athletic Trainers' Association: A Modular Approach, 2004; Palmer, 2002). Starkey (1997), years ago, was able to foresee that clinical education would evolve into the most pressing issue in athletic training education today. Turocy, Comfort, Perrin and Gieck (2000) openly admitted that the NATA Task Force on Educational Standards as well as the NATA Education Council had both recently exposed clinical education as an area of weakness requiring further review.

The clinical education experience in undergraduate athletic training education programs is situated in a very complex environment (Cummings, 2004). Refining programs and initiating reforms to improve clinical education is equally as complex (Peer, 2003). Because of this, Cuppett (2003) stated that many challenges and issues have arisen in clinical education. Rushton and Lindsay (2003) provided evidence of a variety of issues in clinical education models that warrant ongoing research. Few scientific investigations have been found that have attempted to study the curricular design of clinical experiences (Turocy, Comfort, Perrin, & Gieck, 2000).

Because of this, an unknown number and style of experiences (Bullogh, et al., 2002; Peer & Rakich, 2000) that dramatically differ between the athletic training education programs (Turocy, et al., 2000) is occurring throughout this country. This can only lead to highly variable learning opportunities (Weidner & Laurent, 2001; Wetherill, Burton, Calhoun, & Thomas, 2001) that are randomly chosen, at best (Cummings, 2004; Weidner & Laurent, 2001). This highly variable and complex clinical education environment is now being used as a forum to teach students without any understanding of the effectiveness of the clinical instructors that are placed in these roles (Platt Meyer, 2002). Another item that needs further clarification and research is the assessment of clinical education (Cummings & Boote, 2003; Peer, 2003; Strohschein, Hagler & May, 2002; Turocy, et al., 2000; Weidner & Henning, 2002).

The need for further research and higher standards in clinical education continues to be demanded by many (Cummings & Boote, 2003; Denegar, 1997; Erickson & Martin, 2000; Laurent, 2000; Palmer, 2002; Peer, 2003; Weidner & Laurent, 2001). No one needs to state how obviously important the quality of clinical education is to both the development of future athletic trainers and to the health of the profession itself. However, many have (Berry, Miller & Berry, 2004; Cummings, 2004; Erickson & Martin, 2000; Harrelson, et al., 1998; Laurent, 2000; Laurent & Weidner, 2001; Weidner & Laurent, 2001). Denegar told us in 1997, that the profession of athletic training relies on student athletic trainers in the clinical settings in a manner unprecedented in other health care or medical professions. Every person involved in athletic training education sees the potential value and opportunity for clinical education to one day become the capstone experience it is so often acclaimed to be (Cummings, 2004). Thus, it is an understatement to mention that clinical education must now be designed with sound

instructional and curricular principles to drive this educational experience to its inherent levels of greatness.

Competencies and Proficiencies

The National Athletic Trainers' Association Education Council identified the competencies and proficiencies that help define the skill sets of an entry-level athletic trainer (novice) as well as assist in the development of the curriculum for students enrolled in Commission on Accreditation of Allied Health Education Programs accredited undergraduate athletic training education programs (NATA Athletic Training Education Competencies, 1999). These competencies serve as an educational roadmap culminating in the students' ability to sit for the National Athletic Trainers' Association Board of Certification (NATABOC) examination upon graduation. A subset of the competencies, there are roughly 1,230 clinical proficiencies (NATA: A Modular Approach, 2004). These proficiencies help to define the clinical education curriculum and to describe the clinical skills students are expected to master.

In attempting to create a curriculum that allows all students to successfully accomplish the 1,230 clinical proficiencies, many voices have cried out. Wolfe and Nogle (2002) noted that not only are there too many competencies to demand a student to master, but some of them are actually untenable. Sexton (2003) admitted that the sheer number of clinical skills is growing continuously, while Denegar and Hertel (2002) asked for the merit of these competencies to be examined. Others are beginning to question the resultant learning process that occurs after attempting to implement all the competencies and proficiencies into one curriculum (Cummings, in press; Parker & Pitney, 2003; Peer, 2003).

In spite of the amount of negativity attached to the competencies and proficiencies, some educators do see a light at the end of the tunnel. While Walsh, Kugler and Bennett (2003) have dared us to look within ourselves to develop appropriate, creative methods to assess the competencies and proficiencies, Tekian (2002) asked athletic training educators to provide structured learning opportunities that allow for mastery as well as remediation within the curriculum. Since there is no research to date that can truly identify and predict student success (Middlemas, et. al., 2001), the challenge continues to present itself as one of designing an effective curriculum that optimizes appropriate pedagogical and instructional strategies.

Clinical Instructors

Historically, evidence has shown that many in the field of athletic training education feel that one of the most important components in the equation of success for athletic training education programs is the clinical instructor, now recognized as an approved clinical instructor (ACI) (Berry, Miller & Berry, 2004; Curtis, Helion & Domsohn, 1998; Derdall & Urbanowski, 1995; Lauber, Toth, Leary, Martin & Killian, 2003; Laurent, 2000). Even though the ACI is seen as an integral part in the program, more needs to be done in exploring the actual role and instructional practices of these ACI's, as demonstrated by many (Berry, Miller & Berry, 2004; Cummings, in press; Derdall & Urbanowski, 1995; Foster & Leslie, 1992). We do know, however, quite a bit about their skill sets and their assumed responsibilities. Communication skills (Weidner & Henning, 2002), leadership skills (Platt Meyer, 2002), mentoring abilities (Curtis, Helion & Domsohn, 1998; Palmer, 2002), and the demonstration of appropriate professional behavior (Curtis, et al., 1998; Lauber, et al., 2003; Laurent & Weidner, 2001) all

have some degree of impact, either positive or negative, on the outcomes of athletic training students. Not one student can progress through their educational program and be unaffected by their clinical instructors. The uncertainty lies, then, in how the students are being affected by these ACI's.

In 1992, Foster and Leslie found that ACI's with foundational knowledge in teacher preparation were able to develop a larger, more successful repertoire of instructional strategies. Yet as recent as the past two years, we still find researchers attempting to pen answers for the disconnect occurring between being a certified athletic trainer and a competent ACI (Palmer, 2002; Swann, 2003; Walker, 2003). Proper supervision of athletic training students can lead to a very positive, and enriching learning experience (Starkey, 2002), as we all know. Anderson, Larson, and Luebe noted in 1997, that supervision of these students was proper, for that time. However, more recent studies have found supervision to be suspect, at best (Cummings & Boote, 2003; Palmer, 2002). Compounding the issue of inappropriate supervision is the apparent dissonance found within the heart of the undergraduate athletic training curriculum. Moercke and Eika (2002) stated that typically, those who develop curricula and those who must follow it do not share a common set of goals. In order for this disjointed curriculum to work, many programs have begun to rely heavily on off-site clinical settings and ACI's (Konin, 2004). With so many players at the table, opposing goals between the ACI's and athletic training students have begun to surface (Cummings, 2004). Cummings found that the ACI's focus mostly on the mastery of daily tasks while the students desire to focus on professional and personal development issues during these experiences. All of these curricular concerns lead to one thing – poor design and implementation of the undergraduate athletic training curriculum that ultimately negatively impacts the educational experience of these students.

Instruction

E. D. Hirsch (2000) tactfully reminded us of one of our greatest responsibilities. As educators, we must discover and apply the appropriate mix of pedagogical and instructional strategies to the inherent needs of our students. Once this is accomplished, mastery of the specific domain will naturally occur. Another renowned educational scholar, Elliot Eisner (1971a) expanded on the importance of quality instruction. He urged educators to begin a journey that will force them to continually assess their own instructional techniques. Dillon (1986) and Linn (1986) both joined this line of thinking and helped further the quest for excellence in instruction. As early as 1997, Martin and Buxton were calling out to athletic training educators to create pedagogical and instructional strategies specific to the athletic training education curriculum. Starkey, also in 1997, challenged athletic training educators to alter their current pedagogical and instructional methods to catch up to the ever-changing needs of the profession. Apparently, the appropriate time for this is now and not then.

Even though many of were taught mainly by lecture formats (Craig, 2003a), as educators, the desire is to instruct with proven, novel methods (Perkins, 2003). Hirsch (2000) had a great deal to say about instructional strategies. Most noteworthy, is his easily understood but not too often practiced observation of knowledge acquisition. That being, if you teach fragmented knowledge your students learn fragmented knowledge. However, if you teach integrated, real-world knowledge your students learn integrated real-world knowledge. Something that seems so simple to attain has become such an elusive chase.

A priority of education is to provide appropriate instructional strategies that will allow students to best learn their domain (Moercke & Eika, 2002). Since the undergraduate athletic

training curriculum is comprised of two main settings, the classroom setting and the clinical setting, it seems readily apparent that these two settings should employ different instructional strategies. Concerned educators have dedicated themselves to researching this. Cummings (in press), Jacobs (2001), Coker (2000), and Harrelson et al. (1998) agree that instructional strategies must be varied according to the setting in which learning is to occur. In the classrooms, critical thinking, deliberation, problem solving, reflective thinking and observations are strategies that enhance learning outcomes. The clinical setting is a prime environment for hands-on activities, case studies and simulations.

Danielson (2002) reminded us that the ultimate change agent in education is quality instruction. Marzano (2003) and Weidner and Henning (2002) made note of the fact that successful ACI's will not only demonstrate effective instructional strategies they will also have more strategies at their disposal with a greater understanding of their implementation. Harrelson, Leaver-Dunn, and Wright noted in 1998, that we must match instructional strategies to the learning styles of our students. Later, in 2001, Brower, Stemmans, Ingersoll, and Langley agreed that there were preferred learning styles, but could not demonstrate a dominant learning style preference amongst undergraduate athletic training students. Therefore, how do we teach what to whom? Even though there is much in the literature regarding sound educational and instructional practices from which ACI's can choose the best practice for instruction has yet to be demonstrated (Palmer, 2002). It is apparent, then, that instructional strategies in athletic training education programs need further review (Kowlowitz, Slatt, Kollisch & Strayhorn, 1996; Laurent, 2000; Sexton, 2003; Weidner & Henning, 2002).

Video-Stimulated Recall

Video-stimulated recall (VSR) is a research process that provides an interactive venue in which the behavior (both verbal and physical) of an individual is recorded (Lyle, 2003). This recording is then replayed for the person(s) involved to stimulate the recall of particular thought processes. The majority of educational research involving video-stimulated recall has been documented through Lyle's work. He noted that stimulated recall has been successfully used in teaching, medicine, nursing, counseling and education. Because it is such a flexible research tool, uses within educational studies regarding pedagogical and instructional design appear to be limitless.

Lyle (2003) noted some of the advantages of video stimulated recall include the ability to capture live experiences, interactive experiences, as well as compare experts and novices. Experiences that are imbedded with novelty and uncertainty have the potential for deeper understanding when VSR protocols are used. Since the real-world setting of athletic training and athletic training educational programs is a complex, highly challenging, constantly evolving entity, the marriage of the two would seem logical. That being said, VSR has few proponents to date in athletic training education, namely Parker and Pitney (2003) and Palmer (2002).

Problem Solving Strategies

In order to function in today's society, one must be able to solve the myriad problems that we are faced with on a daily basis. Nezu (2004) noted that many leaders in various fields have debated this very notion for years. It follows, then, that a primary goal of education has been to help students become skilled problem solvers (Nickerson, 1994). Knowing that most

academic curricula and instructional practices are imbedded with problem solving (Frederiksen, 1984), the more diverse methods we can expose our students to the more proficient they will become at problem solving (McGinn & Boote, 2003).

Most all human beings engage in problem solving to some extent. The natural tendency for us to question things and begin an automatic query to figure things out does not guarantee our success with problem solving (Nickerson, 1994). For some it is an easy task. For others, it is painstaking and laborious. McGinn and Boote (2003) noted that most problem solving provides for a plan of action, goals to implement the plan, and some level of standards to gauge progress. Even with this course of action, problem solvers are only as efficient as the rules or paths that they follow (Hunt, 1994). Delaney, Ericsson and Knowles (2004) stated that even when these rules or paths are not effective, people tend not to take the time to monitor their progress.

The development of problem solving skills begins with becoming intimately acquainted with a specific domain and developing strategies, heuristics, to identify and address problems or situations. The more experienced one becomes, problems begin to be easily structured and carried out, almost automatic and with little thought or effort (Frederiksen, 1984). Frederiksen (1984) noted further that ill-structured problems, as most real world problems are, could actually slow down the problem solving process. McGinn and Boote (2003) concurred by stating that the natural progressions of problem solving processes were represented with delays and hesitancies. The ability to problem solve in novel circumstances is based on our existing knowledge base (Pretz, Naples & Sternberg, 2003) and our ability to process the task (Kotovsky, Hayes & Simon, 1985).

Strategies, or heuristics, used to identify and address various problems have been studied for many years (Chi, Feltovich & Glaser, 1981; Delaney, Ericsson & Knowles, 2004; Groen &

Patel, 1991; Hunt, 1994; McGinn & Boote, 2003; Nickerson, 1994). Methods such as means-end, working backwards, forward reasoning, problem decomposition, and schemas are a few of the most commonly known. Means-end strategies are useful for day-to-day problems that arise (Delaney, Ericsson & Knowles, 2004) and typically involve comparing current knowledge to requisite knowledge to solve a problem. This type of heuristic is used frequently with *novices*. Working backwards is another heuristic used by *novices*. With this strategy, novices literally start at the end and work towards the beginning of the problem. Forward reasoning relies heavily on previous knowledge. The ability to create a template, chunk information and apply it to new situations is characteristic of this strategy (Groen & Patel, 1991; Hunt, 1994). *Experts* frequently employ forward reasoning to solve their problems (Patel, Arocha & Kauffman, 1999). Problem decomposition, or subgoaling, involves breaking the problem into manageable subgoals (Delaney, Ericsson & Knowles, 2004). Finally, schemas tend to be used by *experts* as they rely on previously learned schemata, or outlines, to address novel problems (Hunt, 1994).

The literature on problem solving differences between novices, experienced non-experts (or intermediates) and experts is vast (Chi, Feltovich & Glaser, 1981; Ericsson, 2003; Groen & Patel, 1991; Mayer, 1988; Pretz, Naples & Sternberg, 2003). To sum this rich data, the information will be extracted via the three subject group titles used in this study. Novices tend to use strategies imbedded directly in the problem statement (Chi, Feltovich & Glaser, 1981; Mayer, 1988). Experienced non-experts, or intermediates, tend to recall a good deal of unnecessary information because new knowledge has not been integrated appropriately with their existing knowledge base (Groen & Patel, 1991). Finally, experts tend to choose strategies based on the solution itself (Chi, Feltovich & Glaser, 1981). Groen and Patel (1991) stated that the primary focus of the expert, in medicine, is to remove irrelevant information and pay heed

only to the relevant information. Ericsson (2003) profoundly stated that effectively managing one's knowledge and experience is the true challenge facing experts, not attempting to function without this base of knowledge.

Think-Aloud

Now that think-aloud protocols have attained prominence as highly regarded tools to analyze thinking (Ericsson & Simon, 1998), these authors believe that it is also time for a changing of the guard with respect to verbal data. Ericsson and Simon (1993) believe that verbal data should regain the stature it once had in the research arena. Think-aloud protocols have the ability to uncover in rich detail the processes individuals are attending to while performing certain tasks. This, Ericsson and Simon noted, allows researchers one of the best methods in which to gain access and insight into a persons' cognitive processes.

The beauty of think-aloud protocols is that there is no altering of the individuals' natural thought processes (Ericsson, 2002; Ericsson & Simon, 1993; Ericsson & Simon, 1998). When individuals perform a task following a think-aloud protocol, much more can be observed and documented than had the individual performed the task quietly (Ericsson & Simon, 1993). The most commonly used technique to get the individual to perform the think-aloud process is to simply ask them to "think aloud" while they perform a required task.

Expert – Novice

Expert-novice studies attempt to delve into a specific domain and identify what makes some individuals superior and not others (Ericsson & Simon, 1993; Patel, Glaser & Arocha,

2000). Verbal reports are a commonly used technique to assess the differences between these individuals. In designing studies of expertise, Lyle (2003) noted that it is necessary to create simulations of certain tasks in order to prevent harm from occurring to individuals. Jones (1992) applied this very line of thinking to expertise in clinical reasoning. We are reminded, as we should be, that first and foremost expert-novice studies are simply allowing us to look at people responding to tasks in the manner in which they are best equipped at that time (Bereiter & Scardamalia, 1993).

Ericsson and Simon (1993) have clearly demonstrated that one's knowledge is essentially married to one's ability to perform. Furthering this interesting, but not surprising discovery, is the fact that expertise is domain specific; there is minimal carry-over to outside areas and tasks (Ericsson & Simon, 1993; Lajoie, 2003; Proctor & Dutta, 1995). The attainment of expertise comes after years of tedious, painstaking dedication to a certain area (Proctor & Dutta, 1995) and evolves into a never-ending quest (Alexander, 2003) that requires years of dedicated practice to maintain (Ericsson, 2000). Expertise does not result from years of simply learning or doing something. Bereiter and Scardamalia (1993) reveal expertise to be a journey that progressively takes these select individuals beyond their natural gifts and talents.

A plethora of research exists documenting that experts do display very distinct characteristics that separate them from novices (Ericsson & Simon, 1993; Hmelo-Silver, Nagarajan, & Day, 2002; Lajoie, 2003; Patel, Glaser, & Arocha, 2000; Proctor & Dutta, 1995 Sternberg, 2003) and from experienced non-experts, or advanced beginners (Bereiter & Scardamalia, 1993; Ericsson & Simon, 1993). According to Bereiter and Scardamalia (1993), experts are better equipped to directly handle difficult problems while experienced non-experts tend to retreat and resort to familiar routines and patterns. For the most part, novices attempt

problems that do not require them to stretch or grow in any fashion. Experts display an uncanny ability to retrieve information whenever they need it (Ericsson & Simon, 1993; Proctor & Dutta, 1995). They readily focus on the critical tasks at hand (Butterfield, Slocum & Nelson, 1993). Also, a major difference distinguishing experts from novices and experienced non-experts is that experts' knowledge becomes automated and very efficient (Ericsson & Simon, 1993; Patel, Glaser & Arocha, 2000; Proctor & Dutta, 1995). Because of this, one frequently finds that the problem-solving protocols for experts are more succinct than that found with the others (Ericsson & Simon, 1993). In a study looking at clinical reasoning, Jones (2002) found consistent differences between experts and novices. Validating the findings above, the level of knowledge and the ability to organize knowledge differed dramatically between the groups. In this study, experts were more on target with their information and they had a propensity to chunk information into patterns, thus using fewer words to describe their actions or thoughts.

Knowing this, we find that research in the area of expert-novice studies has yet to be properly applied to the education field, especially in dealing with curricular and instructional issues (Alexander, 2003; Glaser & Bassok, 1989; Lajoie, 2003). The challenge becomes one in which we should be striving not just to identify who the experts are, but to ensure that novices do not stagnate. We must figure out how to propel these novices from their current state beyond the levels of experienced non-experts and ultimately become experts. In an attempt to better understand, and thus better inform, undergraduate athletic training programs how experts do what they do and why they do what they do requires further study in this area. With the current state of affairs not just in American higher education, but in athletic training education as well, the findings from future expert-novice studies just might be the next steps towards the enlightenment and improvement of more appropriate pedagogical and instructional practices.

Summary

A litany of research can be found on educational topics. Of note, though, is the void of research in specific disciplines addressing curricular and instructional practices. Having evidence that what one teaches is actually learned is a real-world concern for educators. Regardless of the outcomes, proof of effectiveness is necessary. Reform is occurring in athletic training education programs at a rampant pace, creating complex issues along the way. Pedagogical and instructional issues have just recently begun to be explored in these settings. Classroom and clinical education complement each other, requiring very different instructional strategies to convey the requisite knowledge. Understanding the current state of affairs surrounding clinical instruction provides the platform for developing better and "best" instructional methods for this unique educational environment. Problem solving strategies differ amongst novices, experienced non-experts, and experts. Video-stimulated recall, combined with expert-novice think-aloud protocols (as used in this study) allows insight to be shed on the specific problem solving strategies of study participants.

CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

The purpose of this study was two-fold: to better understand instructional practices being used in the clinical settings in undergraduate athletic training education programs as well as identify problem solving strategies used by novice, experienced non-expert (ENE), and expert athletic trainers. As previously noted, current instructional practices are suspect, at best, in this educational setting. In order to properly determine "what instructional methods are of most worth" in athletic training clinical experiences, the quest now becomes one of understanding this educational setting in greater detail and also coming to know what is currently perceived as most beneficial.

Knowing and wanting to know have been journeys that man has been on since the beginning of time. Curiosity has always sparked the keen investigator to dig deeper, to want more, to attempt to make sense out of what lies before us. In human subjects, discovering these answers prompts one to query others about many things including their experiences, thinking strategies (Ericsson & Simon, 1993), and exposures to various events and people. This type of exploration, called qualitative research, allows the researcher to understand phenomena (Pitney, 2004; Pitney & Parker, 2001) and provide a rich, detailed view of its happenings (Creswell, 1998). Pitney, 2004, noted that recent studies demonstrate the increasing prominence and acceptance of qualitative research. Wanting a deeper understanding of the instructional practices in the athletic training educational environment provides the platform for a sound qualitative design.

Study Location

This study involved three institutions with CAAHEP accredited undergraduate athletic training education programs. All programs were geographically located in the Southeastern region of the United States. Program A is part of a public Division 1 state university system; Program B is located in a private, religious college; and Program C in a public Division 2 state college. Each participating institution secured a classroom or laboratory space for the study prior to the Principle Investigator's arrival. Attention was placed on providing a well-lit room with ample space and ambient temperature. Acoustics in each room were studied to afford good opportunity for video and audio recording. Each program was responsible for providing the necessary supplies that each subject might need to properly perform the required tasks (see Appendix B). The physical layout of the room was intentionally planned to spotlight the subject's interactions with the model and provide intimacy and privacy in the administration of the video-recorded sessions. All windows were covered to ensure confidentiality and unintentional biasing to those currently performing the study or those waiting to enter the room.

Subjects

Qualitative research strategies demand in-depth interviews in various formats. Due to the nature and design of qualitative studies, it is appropriate to select approximately ten (10) subjects according to Creswell (1998). For the purposes of this study, nine (9) senior-level students and ten (10) Certified Athletic Trainers who act as Approved Clinical Instructors were chosen from the three participating programs. The students were chosen prior to sitting for the National Athletic Trainer's Board of Certification Exam. Current senior-level students, and/or recent

graduates, were selected by the Athletic Training Education Program Directors to participate in this study. According to the classification system of Bereiter and Scardamalia (1993), students were classified as "novices" throughout this study. The 10 ACI's were also selected by the Program Directors. Five of the ACI's had been performing their professional duties less than 10 years and were classified as "experienced non-experts". The remaining five ACI's had been certified and working in the profession of athletic training for at least 10 years and were classified as "experts". Ericsson (2000) and Proctor and Dutta (1995) concurred that an expert is one who has deliberately practiced his domain for a minimum of 10 years. Practice along with continued learning combine to propel one to expert levels, according to Bereiter and Scardamalia (1993). Purposeful sampling was used to best select appropriate students and ACI's to ensure that a certain level of understanding existed both in the clinical education experience obtained at their respective programs and also in the purpose and design of this study.

A model was chosen and trained in expected non-responsive behaviors. Due to the travel involved between the study sites and other logistical concerns, a different model was used at each study location. Each model was chosen based on professional decorum, maturity and availability.

Study Design

Bereiter and Scardamalia (1993) and Ericsson and Simon (1993) described the use of verbal reports to be appropriate in studying the differences between novices, experienced non-experts, and experts. They found that these verbal reports have not only become an acceptable research platform, but that the verbal reports provide insight into the thinking and memory skills

of the subjects. With this in mind, the subjects in this study were administered think-aloud protocols with a stimulated video recall format. The novices, experienced non-experts and experts were all administered the same protocol (see Appendix C).

A think-aloud protocol was used to allow the subjects to talk freely while they performed common tasks that an entry-level ATC should be able to perform. Ericsson and Simon (1993) noted that the difference between think-aloud protocols and talk-aloud, or explaining protocols, is that the focus is primarily on verbalizing any and all of one's thoughts in the think-aloud. They expanded on this by stating that think-aloud protocols have not been found to influence or cause deviations to one's thoughts. In think-aloud protocols for this study, prompting from the researcher began as "think aloud as you perform the following task…" Subsequent prompting was merely that of "remember to think aloud" after a prolonged absence of verbalization (10 – 20 seconds). In talk-aloud protocols, promptings from the researcher encourages further descriptions and explanations; i.e. "tell me what you are thinking". Noting that most people require little instruction or clarification to think aloud, Ericsson and Simon (1993) did mention that the most common method for thinking is in a mode of silence.

Stimulated recall has been successfully used in medicine and education (Lyle, 2003). It has been used sparingly in athletic training education, with Parker and Pitney (2003) and Palmer (2002) being the only noted advocates at this time. A video stimulated recall format was used with the subjects being asked to answer two (2) sample questions and four (4) main questions similar in nature to those administered in the Practical Simulation portion of the NATA BOC examination (see Appendix D). The questions were designed with a linear progression in problem solving skills involved from the first sample question to the last main question. The sample questions were both low-level cognitive tasks that relied mainly upon action with rote

recall. Applying an ice bag to the right distal quadriceps for a contusion is a fairly mundane task that all athletic trainers should be able to perform without having to call upon many thought processes or strategies. Next, buddy taping the left middle finger does require a higher level of cognition and problem solving as repercussions do present if the tape is not applied properly, blood circulation is compromised or the finger is left in an unprotected state. Performing a Lachman's test to assess the integrity of the anterior cruciate ligament (ACL) is an important skill to master, as the ACL is one of the most common non-contact soft tissue injuries in athletics. Proper diagnosis is crucial in preventing the possibility of exacerbating a fairly common injury into a potentially career ending injury for the athlete. Patient positioning, hand positioning, modifying the test technique per patient and interpreting the test outcomes all require higher level cognitive skills. In taping the left elbow to prevent hyperextension, even higher cognitive skills and greater problem solving is required. Proper arm positioning, proper tape selection, taping technique, understanding the athletes' sport and position to know the allowable materials and limitations, and maintaining proper circulation all while preventing further injury and allowing the athlete to safely return to competition force the athletic trainer to call upon a myriad of cognitive and problem solving skills. Assessing low back range of motion can prove to be quite a complex task. Determining whether to assess active, passive, or resistive range of motion and when is a daunting challenge to most athletic training clinicians. Then, identifying the appropriate assessment tool, using it properly, and understanding the implications of the measurements calls upon an even higher order set of skills. Finally, designing a return-to-play rehabilitation program for a Grade I inversion ankle sprain requires the highest level of cognitive skills. Recall and processing of knowledge in acute injury care, modalities, therapeutic exercise, functional activities, taping and bracing, assessments and re-assessments, functional

sport-specific testing, periodization, and more were called upon in order to properly address and problem solve through this last question.

Describing the advantages of video stimulated recall including the ability to capture live experiences as well as comparing experts and novices (Lyle, 2003), the practical simulation was chosen as it provides a great opportunity for a think-aloud format while responding to questions requiring physical responses with various levels of cognitive complexity, as previously described. These questions were identified through the NATA's Role Delineation Study (1999), which clearly states the specific skills which an undergraduate student should be taught and which an entry-level ATC must be able to perform in order to pass the NATA BOC exam. Unfamiliar cases best depict the differences between novices, experienced non-experts and experts (Bereiter & Scardamalia, 1993). Following this paradigm, all questions remained undisclosed until they were revealed to each subject at the time of the study.

While the subjects were responding to the questions in a "think-aloud" fashion, they were video recorded. After performing the two sample questions and the four main questions, a stimulated video recall session was performed (see Appendix E and Appendix F). Stimulated recall was chosen in order to help prompt the subjects to recall their thoughts and not have to rely on memory prompts (Gass & Mackey, 2000). During this recall session, the subjects were prompted to review only verbal comments during their responses. They were instructed to break each question down into smaller learning tasks or units, if they felt it was appropriate. The subjects were allowed to either request the tape be stopped to comment on the learning units as they arose or they could list them at the end of each question. Butterfield, Slocum and Nelson (1993) convey the notion that learning occured in single units, or concepts. Identifying these units is one of the components in understanding the essence of what someone has learned. They

took this even further by saying that optimum learning occurs when instructors exemplify what they teach. Keeping true to this concept, the novices, ENE's and the experts were asked to break each of the questions into units in an effort to distinguish any differences or similarities that may be found in their respective connotations of the learning units for each question. The novices were then asked a series of questions about the learning units. They were initially asked to identify where in their educational programs they *first* learned the various units that they stated and how these units were *first* presented to them. Second, they were asked where they *best* learned them and how they were *best* taught. This was done in an effort to identify where in the athletic training education program students were learning certain skills and also to ascertain what instructional practices are deemed to be "of most worth". Field notes were taken and this data was recorded by hand on a separate chart for each subject.

According to Pitney (2004) and Creswell (1998), triangulation is used as a strategy that employs multiple methods of data collection. This multi-mode approach helps to establish credibility. The multiple-methods that were used in this study included the following: artifacts from the university's undergraduate athletic training education program (i.e.: program of study, clinical experiences, faculty and student demographics), video-stimulated recall session, and the analysis of the subjects' problem solving strategies. These sources of information were used to bring insight to the themes and trends that emerged from the data.

Analysis of Data

The think-aloud sessions of each subject were transcribed and then verified. Verbal data was analyzed from two main viewpoints. First, the learning units or tasks that each subject

identified for the study questions were organized, coded and then analyzed. From the review of literature, a coding system evolved. As the transcriptions were analyzed, more codings came forth. Being mindful of the notion that Butterfield, Slocum and Nelson (1993) set forth as stated above, emphasis was placed on the learning unit analysis to identify any differences or similarities in the perceptions of learning units (i.e. knowledge) that emerged between the novices, experienced non-experts, and the experts. Also, a descriptive analysis of the novices' self-reports of effective instructional strategies was performed with this same data. Lastly, using the think-aloud protocol data, common trends and themes that emerged, as well as differences, in the problem solving strategies of the three subject groups were then determined.

Verbalizations are typically coded as noted by Ericsson and Simon (1993). Level 1 and Level 2 verbalizations have been found to minimally impact observable outcomes. Level 1 verbalizations are recorded as those in which the subject merely expresses his/her thoughts without effort. It must be noted that distinction should be made between the subjects talking to himself/herself versus talking outwardly to others. Level 2 verbalizations are identified as those that describe or label the subject's thoughts. This level of verbalization requires the subject to mentally recode the information and then verbalize it. Level 3 verbalizations actually require the subject to explain his/her thoughts, forcing a transition from a think-aloud protocol to a talk-aloud protocol.

For the data that was gathered in this study, the verbalization levels as put forth by Ericsson and Simon (1993) were not used. The intent was to use their model for data analysis. However, as the data began to emerge, it became apparent that this model would not meet the needs of the analysis required for this study. The variances in level 1, 2, and 3 verbalizations

between the three subject groups was so great that the overarching purpose of this study would have been lost in the attempts to decipher verbalization levels.

CHAPTER FOUR
DATA ANALYSIS

This study provided a broad representation found from each of the three undergraduate athletic training education programs. Private, public, large, small, male, female, collegiate athletic trainer, academic positions, experts, novices and more were all represented in the sampling. Recent graduates and current students participated. Experienced non-experts as well as very seasoned experts were willing to commit their time to this undertaking.

Subjects were asked to identify learning units from the video stimulated recall sessions that were performed. The learning units that each subject identified were transcribed, coded and analyzed to help shed insight into their knowledge regarding each of the study questions (Butterfield, Slocum & Nelson, 1993). These learning units were looked at to attempt to identify any differences or similarities between the novice, experienced non-expert and the expert perceptions. A descriptive analysis was performed on the reports given by the novices regarding where and how these learning units were *first* taught and *best* taught. This information was used to ascertain two things: first, where in the undergraduate athletic training education program do students learn, or fail to learn, particular skills; and second, what do the novices perceive to be "instructional methods of most worth". Transcriptions were then analyzed to attempt to understand the commonalities and/or differences in the problem solving abilities of these three groups. The learning units themselves and emergent themes were studied as well. Finally, demographics from each of the three undergraduate athletic training programs were analyzed. Student populations, teaching faculty, ACI's, and clinical sites were taken into consideration for the demographic inquiry.

Perceptions of Effective Instruction

In looking at effective instruction, *where* learning units were taught as well as *how* they were taught was taken into consideration. The learning units that the novices described were carefully coded. The environment in which the teaching of these units occurred was analyzed first. Where the learning units were first taught was compared to where the learning units were best taught. In looking at how the units were taught, attention was focused on how the novices felt the units were first taught and how they felt the units were be best taught. Ultimately, the answer to the question of "what instructional methods are of most worth" unfolded.

The novices made their own decisions about whether or not the questions in the study could or should be broken down into learning units. After doing this, they were instructed to identify where each learning unit was first taught and how it was first taught. Then, they were asked to determine where they felt the units were best taught and how they were best taught. The novices were not led into their responses with any qualifying answers. The subjects initiated all answers.

For the purposes of this data analysis, the novice responses were presented with a slightly different grouping than the manner in which they were collected. Instead of looking at where the learning units were first taught and how they were first taught followed by where they were best taught and how they were best taught the groupings were changed. The change in the groupings for the sake of this analysis was done to be able to best depict the passion and the emotions expressed in the responses of the novices. Where the learning units were first taught and then where they were best taught became one grouped analysis and how the units were first taught and how they were best taught became the second grouped analysis.

Where do students learn, or fail to learn, particular skills?

First Taught

The novices stated that 48 of the 58 reported learning units were first taught in the classroom setting (see Table 1). Four units were first taught in both the lab and clinical settings respectively. Learning units first taught in the lab included: special tests and endpoints, modifications of the Lachman's test, elbow hyperextension taping technique, and bracing for the elbow. The learning units first taught in the clinical setting were: elbow taping and ankle rehabilitation techniques. One novice from Program B reported elbow hyperextension taping as "not taught; I observed another athletic trainer doing the elbow hyperextension tape job on the sideline at a game." Also, a novice who was a current student in Program C mentioned that he had not yet been taught how to assess low back range of motion. He stated he had not been instructed on this yet because he had not taken this particular class prior to this research study. Assessing low back range of motion was taught exclusively in the classroom for the initial introduction of the concept to the students.

Best Taught

The clinical setting was mentioned most frequently as the setting in which learning units were best taught. The clinical environment produced 23 of the 58 best-taught learning units. The classroom was cited as the next choice in locations for learning to occur. Twenty of the 58 learning units were identified as being best taught in the classroom. Six of the units were best taught in the lab, or practicum, setting. The lab setting was mentioned as the best environment to teach the Lachman's test to assess for ACL integrity, elbow hyperextension taping and low back trigger points. There were three units that two students from Program A had no memory being

taught (assess low back range of motion), thus there could be no location stated where the best instruction took place. One student did note that she "didn't remember doing it" and another student mentioned that she "had no formal instruction; had to pull it together by myself". Because one novice was still a student in Program C, two units were reported as not having been best taught yet (test for low back range of motion and design a return-to-play ankle rehabilitation program). One unit was reported as best taught during an internship experience (design a return-to-play ankle rehabilitation program) for a novice in Program B. One subject from Program A noted that self-practice was the best setting for her to learn how to perform a Lachman's test. Another subject, from Program C, stated that she best learned the Lachman's test prior to entering the undergraduate program. Lachman's had been taught to her as a high school student athletic trainer. A novice from Program B stated that designing a return-to-play ankle rehabilitation program had not been *best* taught, leaving strong concerns for what may have occurred. She stated, "there were no applications of rehab techniques done in the program".

What instructional methods are of most worth?

First Taught

The novices in this study identified a total of 58 learning units, with the study question being listed 28 times as the learning unit itself. (see Table 1) Of the learning units reported, 40 out of 58 units were first taught via lecture format. Observational methods, or watching, were used to introduce 13 of the learning units. Three of the learning units mentioned by the novices were first taught by having to read the textbook. These units were: Lachman's test, elbow tape job, and low back trigger points. Students from both Program B and Program C reported reading

as their first introduction to a unit. One student reported that assessing low back range of motion had not been taught to him yet. This lends credence to the fact that this subject was a current student enrolled in Program C. Also, of interest, was the fact that a student from Program B stated that elbow hyperextension taping had never been taught. She simply reported, "it was not taught". Even though all the novices reported that assessing low back range of motion was taught exclusively in the classroom, multiple instructional strategies were used in introducing this learning unit.

Best Taught

Hands-on learning proved to be the most effective method of instruction as reported by these novices. They cited hands-on learning 39 times as the form of best instruction for various learning units. However, for assessing low back range of motion, hands-on instructional strategies were only mentioned one time as a best teaching strategy. Observation was the next best means of effectively instructing the novices. Nine learning units were reported as best taught via observation. These nine units fell under all four of the questions asked in this study. Three of the 58 units were best taught with lecture format. These learning units were: low back range of motion, healing stages of injury, and rehabilitation. Both novices from Program A reported that they did not remember assessing low back range of motion being taught at any point in their curriculum. They both said the exact same thing, "I don't remember doing it!" The same novice who was still enrolled in Program C, as mentioned above, stated that two learning units (study questions #3 and #4) had not been taught in his coursework yet. One subject from Program B noted that there was no "best taught" method for designing an ankle return-to-play rehabilitation program. She felt that there was no application of the rehabilitation unit during her

program of study. Also, a novice from Program B noted that she was best taught how to assess low back range of motion during a group discussion with her peers.

Table 1

Perceptions of effective instruction

		Lachman's	Elbow Tape	Low Back	Ankle Rehab
Where units taught:					
	first taught:	15 – class 2 – labs	10 – class 2 – labs 1 – clinical 1 – not taught $_{B3}$	10 – class 1 – not yet $_{C1}$	13 – class 3 – clinical
	best taught:	7 – class 4 – clinical 4 – labs 1 – self practice 1 – before program	7 – clinical 6 – class 1 – labs	3 – clinical 3 – class 3 – do not remember doing it $_{A}$ 1 – labs 1 – not yet $_{C1}$	9 – clinical 4 – class 1 – internship 1 – not yet $_{C1}$ 1 – it wasn't $_{B1}$
How units taught:					
	first taught:	14 – lecture 2 – observe 1 – read $_{C1}$	6 – lecture 6 – observe 1 – read $_{C1}$ 1 – not taught $_{B3}$	8 – lecture 1 – observe 1 – read $_{B2}$ 1 – not yet $_{C1}$	lecture – 12 observe – 4
	best taught:	16 – hands-on 1 – observe	11 – hands-on 3 – observe	4 – observe 3 – do not remember doing it $_{A}$ 1 – lecture 1 – hands-on 1 – peer discussion 1 – not yet $_{C1}$	11 – hands-on 2 – lecture 1 – observe 1 – not yet $_{C1}$ 1 – it wasn't $_{B1}$
Total units: (58)		*(17)*	*(14)*	*(11)*	*(16)*

Note. $_{C1}$ = specific student, $_{A}$ = all students in that program.
Class = classroom, lecture hall; labs = labs and/or practicum; clinical = clinical experiences and/or training room.

Summary

The majority of the learning units identified by the novices were first taught in the classroom setting. Assessing low back range of motion was taught exclusively in the classroom. The clinical setting and the classroom environment were listed as the most effective arenas in which the learning units in this study were taught. One novice from Program B reported that elbow hyperextension taping had not been taught, while both novices from Program A revealed that assessing low back range of motion had not been taught in their curriculum. Several other comments arose from these novices that revealed learning occurring outside of the formal curriculum. One novice felt that she best learned how to perform a Lachman's test on her own; one novice stated that designing a return-to-play rehabilitation program was best learned during an internship; while another novice mentioned that she best learned how to perform a Lachman's test as a high school student athletic trainer. Also, one novice noted that designing a return-to-play rehabilitation program for an ankle injury had not been best taught.

Most learning units were first introduced to the novices through lecture formats. At the same time, these same novices reported that learning units were best taught to them via hands-on learning activities. Even though assessing low back range of motion was first taught exclusively in the classroom, the instructional strategies used to teach it were very diverse. Both novices from Program A report not remembering it being taught. A novice from Program B noted that it was not formal instruction that helped her to understand how to assess low back range of motion. Rather, it was through conversations with her peers that gave her insight into this learning unit. Since one novice had not reached the point in his curriculum for instruction on assessing low

back range of motion, it seems roughly half of the novices could claim that it was taught in their program of studies.

Problem Solving Strategies

Problem solving strategies of the three groups were analyzed next. The think-aloud responses from the four main questions were transcribed, organized, and coded. The narrative from each subject was studied to detect any trends that evolved through either the review of literature or through the natural evolution of the study. The intent at the beginning of the study was to use the model as set forth by Ericsson and Simon (1993). This model was addressed previously in Chapter Three. However, as the study progressed and matured, it became evident that this model was not appropriate for this particular study. Instead of employing the Level 1, Level 2 and Level 3 verbalizations as put forth, this study found a need for a different level and/or classification system. Level 1 verbalizations of the novices varied greatly from that of the experienced non-experts as well as from the experts. The same pattern emerged for the Level 2 verbalizations. What was noticed was that across the groups, Level 1 and Level 2 verbalizations were so vastly different, that the analysis would have merely become a plethora of differences and few, if any, similarities. Instead, five new categories were established after intimately reading the think-aloud transcriptions. These five categories were: instructions/questions to the model, evaluative statements, self-focus/self-talk, task descriptions, and comments/questions to the investigator. Trends that emerged from each of the four study questions were then analyzed. Remaining mindful of the fact that novices, experienced non-experts and experts all display unique characteristics in their problem solving abilities (Bereiter & Scardamalia, 1993; Ericsson

& Simon, 1993; Hmelo-Silver, Nagarajan, & Day, 2002; Lajoie, 2003; Patel, Glaser, & Arocha, 2000; Proctor & Dutta, 1995; Sternberg, 2003), this study set out to find those precise differences that distinguish these groups of athletic trainers.

Perform a Lachman's Test

All five of the categories stated above revealed that the experts expressed more comments during their think-aloud protocols than the other two subject groups. The novice subjects produced the fewest total number of comments (see Table 2). All three subject groups responded most often with descriptions about specific tasks. For example, an expert from Program B commented with the following in response to question #1: "have him scoot back… palpate all structures… extend his knee… test other side…" Self-focus/self-talk comments were made next by the experts and experienced non-experts, in rank order, followed by evaluative comments, instructions/questions to model, and comment/questions to the Principal Investigator (PI). The novices responded in similar fashion as the other two groups did, except that the second most frequent category made by the novices was instructions/questions to model with self-focus/self-talk being third.

Self-focus/self-talk comments made by the experts tended to be self-focusing statements and spontaneous humorous comments. An expert from Program B demonstrates an example of this type of comment. She notes, "right is involved… Lachman's… okay…" Another expert from Program B states, "what am I thinking… boy, this table is high!" Most of the self-focus/self-talk of the other two groups appeared to be used primarily as fillers so they could remain talking. Comments such as "okay… alright… so…" were made frequently by these two

subject groups. Verbal interactions with the model occurred more frequently with the experts, and were of a more personal, friendly tone. “Okay, I know you just hurt your knee… gonna need you to really relax… need you to lay back for me, please” were typical instructions/questions made to the model by the experts. The verbal interactions between the novices as well as the experienced non-experts with the model were more directional and in the form of commands. For example, their comments looked like this: “lay back for me… relax… slide over this way… sit up here.” Across the groups, the evaluative statements were essentially of the same nature. Most evaluative comments were assessing the model and the outcome of the Lachman’s test. “he’s not too large… solid end feel” were frequently examples stated by all subjects. Both the expert and novice groups made comments/questions to the Principal Investigator. Their comments were mostly asking for clarification and announcing completion of the task. The experienced non-experts made no verbal comments to the investigator during this question.

Table 2

Trends emerging from problem solving comments: Lachman’s Test

	Novice	Experienced Non-Expert	Expert
task descriptions	67	84	124
instructions/questions to model	15	17	21
self-focus/self-talk (controlling attention)	12	22	35
evaluative statements	8	7	22
comments/questions to Principal Investigator	2	0	5
total # of comments (441)	104	130	207

Perform an Elbow Hyperextension Tape Job

The experts, again, made the most comments in answering this question. As before, the novices made the fewest number of comments. Three of the novices and one of the experienced non-experts required verbal prompting by the investigator to remember to think aloud during this question. Both the experts and the experienced non-experts provided statements in the five categories in the same rank order (see Table 3). First, task descriptions were made most often, followed by self-focus/self-talk, instructions/questions to model, evaluative statements, and finally comments/questions to Principal Investigator. Similar to perform a Lachman's test, the novices responded with comments in this order: task description, instructions/questions to model, self-focus/self-talk, evaluative statements, and comments/questions to Principal Investigator.

The experienced non-experts and the experts made almost the same number of statements about task descriptions. All subject groups commented in a similar manner. Comments such as, "wrap it around… make other X… not too tight… anchor it down" were made by each group. Self-focus/self-talk comments were noticeably more frequent with the experts. The experts' presented with ongoing self-talk dialogue throughout their responses. They appeared to be engaged in a constant check-and-balance process. Expert comments included: "hyper extended elbow… thinking about position… don't have scissors… would probably pad it." Experienced non-experts tended to do most of their self-talk in the beginning and the very end of their commentary. Their comments were, "okay… supplies… alright… learn to protect yourself." The novices, though, seemed to use their self-focus/self-talk to literally prepare themselves for whatever answers they are going to present. A good amount of the self-talk that appeared in the middle of the think-aloud response was quite negative and harsh; "I hate this tape job… haven't

done this in awhile… takes too many hands." Instructions/questions to the model reflected the previous findings. Warm and personal interactions occurred more frequently between the model and the experts. Firm directions and commands typically came forth from both the novices and the experienced non-experts. The novices made more evaluative statements than either the experienced non-experts or the experts. The majority of the evaluative statements made by the novices came at the end of their think-aloud protocols. Most of these statements were very positive and motivational; "beautiful… that's good… it's okay." However, with the ENE's and experts, their evaluative comments were dispersed throughout the dialogue, heavily noticed in the beginning as they determined the effectiveness of certain ideas up front. For example, "doesn't have laxities… got pain here… nothing terribly significant." All three subject groups made comments to the PI, with the experts making the most comments/questions to the Principal Investigator. Basically, the comments/questions to the Principal Investigator mirrored the type of responses given to perform a Lachman's test. Most of these comments were made asking for clarification and announcing completion of the task.

Table 3

Trends emerging from problem solving comments: Elbow Hyperextension Taping

	Novice	Experienced Non-Expert	Expert
task descriptions	162	199	198
instructions/questions to model	48	31	50
self-focus/self-talk (controlling attention)	17	45	97
evaluative statements	17	10	12
comments/questions to Principal Investigator	3	1	8
total # of comments (598)	247	286	365

Test Low Back Range of Motion

Remaining true to the trends stated above, the novice subjects provided the fewest total number of comments and the experts provided the greatest number of comments for this question (see Table 4). The experts made the most comments in each of the categories except one - comments/questions to Principal Investigator. In rank order, the experts' comments were categorized as follows: task descriptions, instructions/comments to model, self-focus/self-talk, evaluative comments, and comments/questions to PI. For the experienced non-experts, their comments fell as such: task descriptions, instructions/comments to model, evaluative statements, self-focus/self-talk, and comments/questions to PI. The novices' comments fell out of line. The greatest number of comments made by the novices was categorized as instructions/comments to model. This was followed by task descriptions, self-focus/self-talk, evaluative comments, and then comments/questions to PI.

Task descriptions again reflected the responses given in questions one and two. However, this time, the experts made the most comments, followed by the experienced non-experts and then the novices. All of the instructions/questions to the model from all three groups reflected a tone of commands and directions, similar to those noted in the previous two questions. The self-focus/self-talk comments from the experts appeared throughout their dialogues again. With comments like "thinking… looked at rotation… stick with active," the experts appear to be constantly monitoring their work. The experienced non-experts made the fewest self-focus/self-talk comments. Almost all of their self-focus/self-talk comments were given at the very beginning and appeared to have been helping the ENE's gather their thoughts and create a plan of action. "Alright… low back range of motion… test low back motion." Here, again, the novices seem to use their self-focus/self-talk to mentally prepare their answers. Comments like "alright… first… test low back range of motion…" were common amongst the novices. The experts made the most evaluative comments followed by the experienced non-experts and the novices. The evaluative comments made by the experts and experienced non-experts were more quantitative in nature with this question. They appeared throughout the dialogue and seemed to answer an immediate concern and then direct the subject towards their next steps. Comments such as "noticing he's going slow… seems symmetrical… little deficit in forward flexion… means little muscular injury" were made and allowed the subject to derive information and predict courses of action. Evaluative statements from the novices were of a generic nature, "good… very good… " Novices made the greatest number of comments/questions to the principal investigator. Several comments were made apologizing for their performance. These comments were, "sorry… I'm sorry…" Novices from Program A felt the need to apologize for

their performance. The experienced non-experts and the experts, again, used questions seeking clarification and comments announcing completion of the task.

Table 4

Trends emerging from problem solving comments: Low Back Range of Motion

	Novice	Experienced Non-Expert	Expert
task descriptions	78	167	215
instructions/questions to model	128	130	140
self-focus/self-talk (controlling attention)	24	17	111
evaluative statements	21	31	47
comments/questions to Principal Investigator	13	2	8
total # of comments (1,132)	264	347	521

Design an Ankle Rehabilitation Program

The comments made here conflicted with the trends that emerged from the first three study questions (see Table 5). Instead of the experts offering the most responses, a new trend came forth. The experienced non-experts made the most total comments and also offered the most comments in all but one category (comments/questions to the principal investigator). The experts' responses and the novice responses were tallied in rank order in the following categories: task descriptions, self-focus/self-talk, and comments/questions to PI. Experts actually gave the fewest comments in one category (self-focus/self-talk) and offered no evaluative comments. The novices responded with no evaluative comments.

A different trend was noted in the task descriptions. Both the novices and the experts remained focused and were able to address the question without much wandering. The experienced non-experts, however, tended to go off on tangents that had relatively little to do with what the question was asking. It was as if they felt that they had to justify specific philosophies and ideologies. Much of their dialogue was in defense of their responses. Examples of this are: "not playing God… don't break that code with coaches… how I played all my life… as long as don't have knee replacement at 45." The difference between the novices and experts was simply what one would expect. The experience and wisdom of being an expert allowed them to bring more information and more options to the rehabilitation program. The type of self-focus/self-talk comments changed from the three previous questions. The experts offered very few self-focus/self-talk comments. These comments were mostly made at the beginning and end of the verbal response. Again, these were grounding statements providing direction and levity. The novices continued their trend in responses to this category. Note, however, that the experienced non-experts responded different than they had before. Their self-focus/self-talk comments were made throughout their dialogue. They were instructional, grounding, and relatively positive in nature. For example, "write down parameters… not gonna worry about that… okay… yes… game in 5 days." Comments/questions to the principal investigator received the most number of responses from the novices. These comments to the investigator included questions asking for clarification, closing statements, more apologetic statements; "I'm sorry… use this… how detailed… going through whole thing?" Comments made by the experts and experienced non-experts were similar to previous responses in that they were asking for clarification and were made as closing statements upon completion of the

question. There were no comments under instructions/questions to model as the model was dismissed from the room and not required for completion of this question.

Table 5

Trends emerging from problem solving comments: Ankle Rehabilitation Program

	Novice	Experienced Non-Expert	Expert
task descriptions	593	1,129	954
instructions/questions to model	n/a	n/a	n/a
self-focus/self-talk (controlling attention)	38	60	25
evaluative statements	0	1	0
comments/questions to Principal Investigator	16	8	8
total # of comments (2,832)	647	1,198	987

Summary

The experts responded with the greatest total number of comments to the four study questions (see Table 6). In three of the five categories, the experts responded with more comments than the other two groups. These categories were: instructions/questions to model, self-focus/self-talk, and evaluative statements. The experienced non-experts gave the most comments in the task description category, while the novices had the most responses in comments/questions to Principal Investigator.

The experts tended to have a more relaxed, personal and playful relationship with the model. This was displayed in how they spoke to the model. The model was referred to by name, jokes were made, and interesting simulations were used to immerse the model in order to help

them address the study question. Rapport appeared to be highly prized by these experts. Self-focus/self-talk comments occurred throughout the dialogue of the experts. They openly spoke attempting to purposefully ground themselves and keep themselves on task. The experts were quite capable of remaining focused on the question at hand. Ongoing self-monitoring appears to take place with these experts, as well. Evaluative comments were made throughout their commentary, with most comments being made in the beginning of each response. At times, the experts demonstrated a propensity towards quantitative evaluative comments in attempting to procedurally work their way through a problem. Comments/questions to the PI were made typically asking for clarification of the question and for announcing their completed tasks.

The experienced non-experts and novices in this study demonstrated many commonalities. Light banter with the model did not occur within the dialogue of the novice or the experienced non-experts. Comments regarding instructions/question to the model tended to be mainly task oriented and making demands of the model. Self-focus/self-talk comments from the novices and experienced non-experts typically were made at the beginning of the think-aloud protocol. These comments appeared to be used often to prevent verbal stalling and to collect their thoughts. The novices also used the self-focus/self-talk comments to help them mentally prepare their answers.

Differences between the experienced non-expert and the novice groups did arise. Probably the greatest distinction between the two groups was the ability of the novice to stay on task while answering the questions. The experienced non-experts had a tendency to ramble and easily stray off of the topic. They also appeared to feel the need to validate themselves and their beliefs. While both groups preferred self-focus/self-talk in the beginning of their dialogue, the experienced non-experts made these comments at the end of their commentary as well. The

novices tended to have comments of this nature interspersed throughout their dialogue and used these comments to formulate their upcoming answers. The novices, asking for further understanding and for making note that they had completed the task at hand, made the most comments/questions to the PI. However, the novices also made statements to the PI in the midst of their responses apologizing for their performances. Evaluative comments made by the experienced non-experts were made throughout their response as they attempted to determine the best plan for answering the question. Experienced non-experts also generated specific, concrete answers in their problem solving. These answers were used to immediately address issues and determine their next steps. The novices, on the other hand, made broad, generic evaluative comments at the end of their responses. They appeared to be assessing the final outcomes of their answers.

All subjects were able to give detailed comments in performing the think-aloud protocol. Some subjects could provide a richer verbal picture than others. Overall, the largest comment response category was task descriptions. No apparent trend amongst the subject groups emerged in the task description category. The category that revealed the fewest comments from all the subject groups was comments/questions to the principal investigator. Both the novice and experts asked questions as they popped into their minds. These questions were asked throughout the entire dialogue. The experienced non-experts tended to ask very few questions of the principal investigator. If they did, they were typically at the beginning of the think-aloud while the ENE was attempting to formulate his/her plan of response.

Table 6

Themes emerging from problem solving comments: Total # comments

	Novice	Experienced Non-Expert	Expert
task descriptions	900	1,579	1,491
instructions/questions to model	191	178	211
self-focus/self-talk (controlling attention)	91	144	268
evaluative statements	46	49	81
comments/questions to Principal Investigator	34	11	29
total # of comments (5,303)	1,262	1,961	2,080

Learning Units

Each subject performed a video stimulated recall session immediately following the completion of his or her think-aloud protocol. Outside of the three research questions in this study, of interest was how do novices, experienced non-experts and experts perceive learning units. Butterfield, Slocum and Nelson (1993) remind us that identifying learning units is a critical step in understanding what someone has learned. As it relates to this part of the study, what are the differences in perceived learning units between the three subject groups? Do novices microscopically break tasks down as the current research indicates? Do experts chunk their tasks, tending to much larger notions and concepts, thus verbalizing fewer comments? (Ericsson & Simon, 1993; Jones, 2002) Where do the experienced non-experts stand, somewhere in between? Is there a difference in how an ACI from a collegiate setting perceives learning units versus an ACI employed in an academic role?

Bereiter and Scardamalia (1993) and Ericsson and Simon (1993) evidenced that verbal reports are not only appropriate in identifying differences in novices, experienced non-experts and experts, but that they also provide keen insight into the cognitive skills of these subjects. While viewing themselves perform the think-aloud protocol, the subjects were instructed to pay attention to their verbal comments only. From these verbal comments, they were asked to break the study question into smaller learning units, if they felt it was appropriate. Again, the learning units could be based only on what they said, not on what they did or what they may have meant to say. The number of learning units that each subject described for each question in the think-aloud protocol was explored to ascertain these differences.

Perform a Lachman's Test

The novices, in general, identified fewer learning units than did the experienced non-experts or the experts in performing a Lachman's test to assess the integrity of the ACL. Six of the nine novices felt that the Lachman's Test was itself one learning unit. They did not feel as if this procedure needed to be broken down into any units. Basically, Lachman's was one learning unit in and of itself. All four novices from Program C considered Lachman's as a single learning unit. Of the remaining three novices, two felt that there were three learning units involved and one novice described five learning units. Examples of these units included: "test technique… ACL's function…what test is used for… bony landmarks." Not one unit was mentioned by all of the novices.

All of the experienced non-experts found there to be three or more learning units that deserved recognition within the Lachman's Test. None of the ENE's could provide a common

learning unit. Both subjects from Program A described five units. Of the five learning units reported, one was listed by both ACI's. That learning unit was "proper positioning". There was no single learning unit listed by all three of the experienced non-experts from Program C. "Understand the test" was stated by both ENE's in the collegiate setting as a common learning unit. Two common learning units were found in the statements made by the ENE's in the clinical/industrial/corporate setting. These learning units were "athlete positioning" and "hand positioning".

The number of learning units with which the experts defined the Lachman's Test varied from three to eight. One learning unit was mentioned by all five experts: "how do/perform the test". The four experts from Program B defined between three and five learning units. The four experts from Program B had no other learning units in common. The expert from Program C identified eight learning units for this test. The three experts in the collegiate setting had no other learning units in common than the one listed above.

Perform an Elbow Hyperextension Tape Job

Not one learning unit was mentioned by all of the novices for this question. Five novices identified the tape job as its own learning unit. One of the nine novices, from Program A, offered no answer to the learning units. She simply said, "There are no learning units in performing an elbow hyperextension tape job." The remaining eight novices offered at least one learning unit a piece. Three other novices, each from one of the three programs in the study, found three learning units within the task. These units included comments such as "closing tape

job… anchors… arm positioning." All three of the subjects described three completely different learning units.

The five experienced non-experts listed between three and 13 learning units. All of the ENE's stated different learning units to this question. Both ENE's from Program A stated that "length of tape", "tightening the arm", and "closing tape job" were important learning units. With the three ENE's from Program C, "purpose/concept of the tape job" was found to be a common learning unit. When looking at the experienced non-experts via their professional settings, the two subjects in collegiate settings had one learning unit in common: "purpose/concept of the tape job". The two subjects in the clinical/industrial/corporate settings had no learning units in common with the other.

Learning units described by the five experts ranged from one to 11. Not one learning unit was found in common by all of the experts. Even the three experts whose primary responsibilities were in the collegiate setting did not have any learning units in common. The four experts from Program B noted between one and five units. The expert from Program C found 11 learning units in the hyperextension tape job.

Test for Low Back Range of Motion

Five novices found the test for low back range of motion to be just one learning unit. Again, with question number three, the same novice from Program A offered no learning units for this task. She furthered her comments, this time noting, "I don't remember doing it." Of the remaining eight novices who described at least one learning unit apiece, three stated that there were two learning units immersed in this task. None of these units were found to have

commonality. Both novices from Program A commented that they had received no formal instruction on low back range of motion; therefore there were no learning units.

No learning unit was consistent amongst all five experienced non-experts. The experienced non-experts listed between three and 10 learning units for low back range of motion. The ENE's from Program A did both state "measure/assess range of motion", "normal values", and "overcompensation/cheating" as learning units. Program C ENE's had no learning units in common. The two collegiate ACI's both listed "use of the goniometer" and "knowing/assessing normal range of motion measurements". Both experienced non-experts in the clinical/industrial/corporate settings listed "Compensatory forces or limitations".

Responses from the experts on low back range of motion varied from one to six. There was no learning unit common to all experts. Even the four experts from Program B had no learning units that were shared by all. The three experts in the collegiate setting also listed unique answers from one another.

Design an Ankle Rehabilitation Program

All novices identified at least one learning unit for this question. Five of the novices found the ankle rehabilitation program to be one unit by itself. The remaining three novices listed between two and five units. Novices from each of the three programs noted multiple learning units. Of the novices listing more than one learning unit, there was no learning unit common to all. However, the two novices from Program B did share "modalities" as a common learning unit.

The experienced non-experts listed between seven and 21 learning units. Not one learning unit was common to all experienced non-experts. The two subjects from Program A found “return to play decisions”, “re-injury”, “range of motion”, “functional activities”, “progressions”, and “inflammatory stage” to be common learning units. The three subjects from Program C mentioned “plan” as a common learning unit. When examining the experienced non-experts by professional settings, “range of motion”, “strength”, and “return to play criteria” were identified by the two subjects in the collegiate setting. The ENE’s in the clinical/industrial/corporate setting stated “plan”, “modalities”, and “progressions” as common learning units.

No learning units were common to all experts for question number four. The four experts from Program B listed between four and seven learning units. The expert from Program C described 14 learning units. Attempting to divide the experts by undergraduate academic programs also failed to show any learning units that were shared with each other. However, all three experts practicing in the collegiate setting cited “communicating with the coach” as an important learning unit.

Total Number of Learning Units Identified

Analysis of the total number of learning units defined by each subject was performed next. (see Table 7) All of the novice subjects listed at least four total learning units (i.e. one learning unit per question). The total number of learning units listed by the novices ranged from 4 to 11. Four of the novices listed only four total learning units. The subject from Program A who stated that there were no learning units for two of the questions, listed a total of six learning

units in all. The novices from Program A detailed between six and 10 learning units a piece. Learning units described by novices from Program B ranged from four to eleven. Three of the four novices from Program C described four learning units while the remaining novice described nine units.

The experienced non-experts learning units ranged in total number from 18 to 45. ENE's from Program A described 43 and 45 total learning units. Learning units identified by the ENE's form Program C ranged from 18 to 36. Breaking the ENE's into professional settings revealed that the collegiate ENE's listed a range of learning units from 18 to 45. ENE's in the clinical/ industrial/ corporate setting identified 23 and 36 learning units apiece. The experienced non-expert representing the academic setting detailed a total of 43 learning units.

Of the four experts from Program B, between 12 and 22 learning units were described. The expert from Program C identified 40 learning units. Experts in the collegiate setting detailed 12, 14, and 40 learning units each. The expert whose primary responsibility was academic-based listed a total of 22 learning units. The expert in the clinical/industrial/corporate setting noted 16 total learning units.

Trends did present with the average number of learning units from each subject group. The average number of learning units mentioned by the novices was 5.8. Experienced non-experts gave, on average, 33 learning units while the experts listed an average of 20.8 learning units. Both the experienced non-experts and the experts in the academic settings responded with the most learning units, on average. The experienced non-experts and experts in the collegiate settings averages ranked next, followed by both ENE's and experts working in the various clinical/industrial/corporate settings.

Table 7

Total number of learning units identified by each subject for all four questions

		Novice	Experienced Non-Expert			Expert		
			C	A	C/I/C	C	A	C/I/C
subject:	#1	4 $_{B}$	-	43 $_{A}$	-	-	22 $_{B}$	-
	#2	6 $_{B}$	45 $_{A}$	-	-	14 $_{B}$	-	-
	#3	11 $_{B}$	-	-	23 $_{C}$	-	-	16 $_{B}$
	#4	6 $_{A}$	-	-	36 $_{C}$	12 $_{B}$	-	-
	#5	10 $_{A}$	18 $_{C}$	-	-	40 $_{C}$	-	-
	#6	4 $_{C}$		n/a			n/a	
	#7	4 $_{C}$		n/a			n/a	
	#8	4 $_{C}$		n/a			n/a	
	#9	9 $_{C}$		n/a			n/a	
ave. number units		5.8 (5.8)	31.5	43 (33)	29.5	22	22 (20.8)	16

Note. $_{A}$ = Program A, $_{B}$ = Program B, $_{C}$ = Program C.
C = collegiate training room, A = academic role, C/I/C = clinical/industrial/corporate setting.
Ave. number units = total # responses ÷ total # subjects.

Summary

Of special interest in looking at the learning units described by the study participants was the fact that rarely, only one time, did all the subjects in a particular group agree on a learning unit. For the question in designing a return-to-play ankle rehabilitation program, the experts provided one common learning unit. No other question in the study revealed universal commonalities amongst the responses from the participants. There were no other common learning units identified.

Most of the novices thought that the question itself was the learning unit. There was no perceived need to break the question down any further. In all, the novices provided between 4 and 11 learning units, averaging approximately 6 units per subject.

The experienced non-experts identified common learning units, but only when observed by program of study or professional work settings. Program A was able to demonstrate the most consistency in their responses. On every question, these two subjects had at least one common learning unit between them. Note, though, that they did not work in the same setting. Also, the collegiate ENE's and the clinical/industrial/corporate ENE's demonstrated shared ideologies on the learning units. As with the ENE's from Program A, the ENE's in the above professional settings identified at least one common learning unit for each question. The ENE's mentioned between 18 and 45 total learning units, with an average of 33 units per person.

Experts in this study found commonality in their learning units once; with question #1 – perform a Lachman's test. Each of the five experts listed one similar unit. Also, the experts in the collegiate setting mentioned one common learning unit in response to the question asking them to design an ankle rehabilitation program. Other than this, the experts did not reveal any other common learning units. The experts were able to describe between 12 and 40 learning units. On average, 21 units were stated per expert. Both the ENE's and the experts in the academic settings described the greatest average number of learning units.

Themes Emerging from the Learning Units

Once the learning units from all three groups were documented, themes began to emerge from the data. Two themes appeared after analyzing the first three study questions. These

themes were: physical performance of the task and knowledge of the task. All learning units fell into one of these two categories. Study question number four was different. Six themes emerged from the data, and were touched on by most of the subjects. These themes were: inflammatory/healing cycle, therapeutic exercise, modalities, return to play, communication skills, and program design. (see Table 8)

Perform a Lachman's Test

The novice subjects identified a total of 17 learning units. Of these 17 units, 12 were classified as physical performances of the task, while five were classified as knowledge of the task. The experienced non-experts stated 24 total learning units. Thirteen units applied to the physical performance of the task and 11 units involved a certain level of knowledge of the task. The experts described 25 units. Nine of the tasks were associated with the physical performance of the task. Sixteen of the learning units applied to the knowledge of the task. Combining the three subject groups, there were 66 total learning units identified. Of the 66 units, 32 pertained to knowledge of the task and 24 to physical performance of the task.

Table 8

Themes emerging from learning units

		Number of Learning Units Per Theme						
		Novice	Exper. Non-Expert			Expert		
			C	A	C/I/C	C	A	C/I/C
question	themes							
Lachman's	physical performance of task	12	5	3	5	8	1	0
	knowledge of task	5	3	2	6	8	4	4
Elbow tape	physical performance of task	13	12	8	10	9	4	1
	knowledge of task	0	4	0	4	5	1	1
	no answer	1	0	0	0	0	0	0
Low back	physical performance of task	9	13	4	9	5	0	2
	knowledge of task	1	1	5	4	6	6	2
	no answer	1	0	0	0	0	0	0
Ankle rehab	inflammatory / healing cycle	3	6	6	11	6	1	0
	therapeutic exercise	1	10	8	4	7	2	2
	modalities	2	0	1	3	1	1	1
	return to play	0	4	4	0	1	1	2
	communication skills	0	0	1	0	5	0	0
	program design	0	5	1	3	5	1	1

Note. C = collegiate training room, A = academic role, C/I/C = clinical/industrial/corporate setting.

Perform Elbow Hyperextension Tape Job

The novices detailed 14 total learning units. Thirteen units were classified as physical performances of the task. No answer was given from one subject, thus it fell into neither the

physical performance of the task nor knowledge of the task. There were 38 learning units identified by the experienced non-experts. Physical performance of the task accounted for 30 of the learning units. Knowledge of the task accounted for eight of the units. The experts described 21 learning units. The theme of physical performance of the task unfolded in 14 of the units. Seven of the units were appropriate for the knowledge of the task theme. The three subject groups combined accounted for 73 total learning units. Of the 73, 57 were categorized as physical performance of the task, while 15 were categorized as knowledge of the task. There was one non-answer.

Test Low Back Range of Motion

Eleven learning units comprised the novice responses. Nine were associated with the physical performance of the task. One was associated with knowledge of the task. Again, there was one student with a non-answer. The experienced non-experts responded with a total of 36 learning units. The physical performance of the task accounted for 26 of these units, while 10 were under knowledge of the task. The experts defined a total of 21 learning units. Seven units were classified as physical performance of the task. Knowledge of the task accounted for 14 of the units. The responses regarding learning units from all three subject groups combined for a total of 68 learning units. Of the 68 units, 42 pertained to the physical performance of the task and 25 to knowledge of the task. There was one non-answer.

Design an Ankle Rehabilitation Program

There were six total learning units identified by the novice subjects. Three were classified as inflammatory/healing cycle, two as modalities, and one as therapeutic exercise. The experienced non-experts described a total of 67 learning units. Twenty-three units spoke to the inflammatory/healing cycle, 22 to therapeutic exercise, nine to program design, eight to return to play, four to modalities, and one to communication skills. The experts detailed 37 learning units. Eleven revolved around therapeutic exercise, seven around inflammatory/healing cycle, seven around program design, five around communication skills, four around return to play, and three around modalities. A total of 110 learning units evolved from all three groups. Therapeutic exercise accounted for 34 of the units, inflammatory/healing cycle accounted for 33 of the units, program design accounted for 16 units, return to play accounted for 12 units, modalities accounted for nine units, and communication skills accounted for six units.

Summary

The vast majority of responses from both the novices and experienced non-experts regarding questions one through three fell into the physical performance domain. For all three of the study questions, the majority of responses from these two subject groups were of this nature. However, the majority of the responses from the experts were categorized as knowledge-based. Two of the three questions showed the experts providing more knowledge-based learning units. Question number two (perform an elbow hyperextension tape job) had the experts listing more physical performance units than knowledge units.

Study question number four unfolded differently. The novices and experienced non-experts placed their greatest emphasis on the "inflammatory/healing cycle". Novices failed to respond with responses in "return-to-play", "communication skills", or "program design" categories. The experienced non-experts placed their lowest priority on "communication skills", "modalities", and "return-to-play". On the other hand, the experts placed their greatest priorities in "therapeutic exercise". With almost equal representation across the categories, the experts also found importance in "program design", "inflammatory/healing cycle", and "communication skills". Categories with the least priority for the experts were "modalities" and "return-to-play".

The areas that the novices and experienced non-experts either neglected or found to be not as important, the experts found to be fairly necessary in properly addressing this study question. As stated previously in this study, rapport with the appropriate individuals (i.e. "communication skills") appears to be quite important for the experts. All three groups recognized the importance of the "inflammatory/healing cycle". At the same time, all three groups concurred that "modalities" was not one of the most important concepts warranting attention at this time.

Program Demographics

Of the three undergraduate athletic training programs, no two programs were alike in their curricular design. Program A was a three-year course of study, Program B four years and Program C two years. Effective spring semester, 2004, Program A had 50 students enrolled in the program. Thirty-three were female and 17 male. Twenty-four of these students were graduating seniors. Program A listed 21 clinical sites and 35 ACI's capable of addressing their

students' needs. Program B, one of few four-year programs in the country, had an enrollment figure of 29 students. Twenty female and nine male students made up this program. Seven students were slated for graduation in the spring semester. Program B had at their disposal 16 clinical sites and 16 ACI's. Program C was a much smaller program. Their program make-up consisted of 17 students: ten female and seven male. Seven students were graduating in the spring semester. Ten clinical sites and nine ACI's were used by Program C to help teach the curriculum. (see Table 9)

Table 9

Undergraduate Athletic Training Program Demographics

	Program A	Program B	Program C
length of program	3 years	4 years	2 years
# students in program	50	29	17
# females	33	20	10
# males	17	9	7
graduating seniors	24	7	7
# clinical sites	21	16	10
# ACI's	35	16	9

All three programs had novices participating in this study. Subjects were considered to be novices if they had either recently graduated and not yet taken the NATA BOC exam or if they were current senior-level students in the undergraduate athletic training program. Two novices were from Program A. Both of these novice subjects were females who had recently graduated from the program. Program B had three novice subjects, all of whom were recent graduates. Two were female and one male. Program C had four novices. Three were recent

graduates while one was a current senior-level student in the program. This group of novices consisted of two females and two males.

A total of five experienced non-experts participated in this study. (see Table 10) Experienced non-experts were defined as ACI's who had been performing their professional duties for less than ten years. Two ENE's came from Program A while three came from Program C. Both subjects from Program A were female. One of the subjects' primary job responsibilities was in the collegiate setting and the other served in an academic role. The academic role represented by this person was that of Program Director. The three experienced non-experts from Program C were all male. One had a primary responsibility in the collegiate setting as the Head Athletic Trainer and the other two functioned in the clinical/industrial/corporate setting. These two ACI's worked together in the same outpatient rehabilitation center. No experienced non-experts participated from Program B. Experienced non-experts were found in all of the professional settings listed in this study.

Table 10

Demographics for Experienced Non-Experts

	Program A	Program B	Program C
# experienced non-experts in study	2	0	3
primary responsibility in a collegiate training room (C)	1	0	1
primary responsibility in an academic role (A)	1	0	0
primary responsibility in a clinical / industrial / corporate setting (C/I/C)	0	0	2
# females	2	0	0
# males	0	0	3

Five expert ACI's participated in this study. Four were from Program B and one from Program C. Of the four experts from Program B, two had their primary job responsibilities in the collegiate setting as Head Athletic Trainers; one was in the clinical/industrial/corporate setting (c/i/c) and one served primarily in an academic capacity as the Program Director. The expert clinical/industrial/corporate subject worked in a Wellness/Fitness Center. Three of the experts were female and two male. One of the experts is a member of the National Athletic Trainers' Association Hall of Fame. The expert from Program C was a male whose primary job responsibility was in the collegiate setting, also serving as the Head Athletic Trainer at his institution. (see Table 11) Program A had no experts in the study or in faculty positions. All professional settings listed in this study were represented by at least one expert.

Table 11

Demographics for Experts

	Program A	Program B	Program C
# experts in study	0	4	1
primary responsibility in a collegiate training room (C)	0	2	1
primary responsibility in an academic role (A)	0	1	0
primary responsibility in a clinical / industrial / corporate setting (C/I/C)	0	1	0
# females	0	3	0
# males	0	1	1

Summary

Program A was a three-year undergraduate program of study. Two novices and two experienced non-experts participated in this study. Both female novices had recently graduated. The two female ENE's represented the collegiate setting and the academic setting. The ENE in the academic setting was a new Program Director. There were 21 clinical sites at their disposal and 35 ACI's that were listed as part of their extensive off-campus educational matrix. No experts participated in this study or were listed in faculty positions.

Program B was one of a select few four-year undergraduate programs in this country. Three novices who had recently graduated participated in this study, two females and one male. Four experts volunteered for this study. Three were female and one was male. One female and the male represented the collegiate setting. Another female represented the academic setting, as a Program Director. The final female expert worked in the clinical/industrial/corporate setting. This program utilized 16 clinical sites and 16 ACI's in their educational program. There were no experienced non-experts participating in this study or on faculty at Program B.

Program C was a two-year educational program. They provided four novices, two females and two males. All but one of their male students was a recent graduate from the program. Three male experienced non-experts participated in this study. Two of the ENE's were working in the clinical/industrial/corporate setting. These two actually worked as business partners in the same clinical facility. The remaining ENE was a collegiate Head Athletic Trainer. The male expert from Program C was a Head Athletic Trainer, as well. This program operated with 10 clinical sites and nine ACI's.

CHAPTER FIVE
DISCUSSION AND CONCLUSION

Findings

According to Pitney (2004), qualitative research attempts to bring rich, deep meaning to individuals' experiences. The credibility of a qualitative study rests on the ability of the reader to find practical application and meaning within the research. With this being said, in order to best project the implications unearthed in this study, the findings will be presented clustered around the three research questions as stated in Chapter One. These questions were: where in the undergraduate athletic training education program do students learn, or fail to learn, particular skills; "what instructional methods are of most worth" in teaching these skills as perceived by the students; and what are the problem solving strategies used by novice, experienced non-experts and expert athletic trainers when confronted with novel situations. Addressing these research questions helped in uncovering the main purpose of this study, which was to better understand the instructional practices being used in clinical education settings in undergraduate athletic training programs. As Slavin (2004) stated, educators must be able to identify and implement practices that are "of most worth".

Where do students learn, or fail to learn, particular skills?

The results of this study support the widely known adage of "first teach, then show, and then do". Recalling that Eisner (1971b) pleads for educators to ensure successful instruction and to maintain accountability and standards in so doing, the findings in this study underscored the

fact that undergraduate athletic training education programs are due for a shot of accountability. Laurent (2000) revealed that over half of the time spent developing our future athletic trainers came while in the clinical settings. The results of this study supported this finding. The majority of the learning in this study was first introduced in the classrooms. However, most of the novices also reported that their best learning occurred in the clinical and lab settings. For the current curricular standards, this is good news since there is an inordinate amount of program time focused on the clinical and lab experiences. The drawback noted here is that enough students (novices) commented on various other avenues in which learning best occurred for them to raise concerns. Even though the novices discussed the same topics within the study, there was not mutual agreement on where they were best taught. In order to adamantly state that there is a "best setting" for learning to occur in the undergraduate athletic training education programs is a bit premature at this time, based on the findings of this study.

What instructional methods are of most worth?

The novices in this study felt that most of their learning first occurred through lecture formats. Not surprising, the novices then reported that their best learning came from hands-on experiences. Knowing that there are essentially two settings where the novices receive their instruction, classrooms and clinicals, it seems prudent that there would be two different instructional strategies emphasized. For the classroom introduction to particular skills, the lecture format appeared appropriate for most tasks. Marzano (2003), Weidner and Henning (2002), and Foster and Leslie (1992) made note of the fact that successful athletic training educators are capable of designing and implementing multiple instructional strategies.

Cummings (in press), Jacobs (2001), Coker (2000), and Harrelson et al (1998) brought forth the idea that instruction needs to be adapted to the environment in which it is being taught. When looking at where and how the novices felt instruction occurred in their programs, this study helps to impress upon athletic training educators to learn various instructional strategies and their appropriate implementation. Taking this one step further, Frederiksen (1984) repeated that there also should be different instructional strategies for various ability levels of these students.

As educators, we are dutifully reminded that one of our greatest responsibilities is to utilize the correct balance of pedagogy and instruction in order to best meet the needs of our students (Hirsch, 2000). Instructional self-assessment is critical for quality instruction to occur (Eisner, 1971a). Having such deeply imbedded truths before us, it seems that undergraduate athletic training education programs have not yet begun this journey. Programs A and B had some instructional issues come forth during the course of this study. As previously stated, the novices in Program A related that they had no recollection of two of the study questions (assess low back range of motion and design an ankle rehabilitation return to play program) being taught in their curriculum. Sadly, this was half of the questions in the study. Ominous clouds of instructional doubt should now encircle this program. How can students imply that such a large portion of the mandated curriculum was not being taught? It could be due to the sheer size of this program, the vast number of ACI's and clinical sites. Platt Meyer (2002) found that there was not a clear understanding of the effectiveness of instructional practices being used by ACI's. This could be due to the fact that there were no experts readily available to assist in this program. It could be that important pedagogical and instructional practices were not yet imbedded into the curriculum. Program B presented with concerns surrounding two study questions. One novice insisted that elbow hyperextension taping was never taught. Another novice stated that return to

play rehabilitation program design for ankle injuries was not *best* taught. Perceptions of missing curriculum could be due to the enormous amount of competencies and proficiencies that must be taught (Wolfe & Nogle, 2002). Knowing that the demographic composite of this program staff was all experts, it could be concluded that pedagogical or instructional issues got in the way of these novices learning, not programmatic issues. Cummings (2004) revealed that ACI's and athletic training students have contrasting goals when it comes to their educational experiences. Sometimes, these differences can get in the way and create missed learning opportunities.

Problem Solving Strategies

According to Jones (2002) and Ericsson and Simon (1993), it is expected that verbal protocols of experts will be shorter and more succinct than novices, or experienced non-experts. Through the years, the notion that experts chunk large amounts of information into smaller, workable units has really never been challenged. Until now. The novices in this study consistently gave the least amount of verbal responses than both the experienced non-experts and the experts. A fascinating find was that the experts actually offered the most verbal comments in this study. This clearly contradicts prior research in this area.

Bereiter and Scardamalia (1993) and Ericsson and Simon (1993) noted that verbal reports helped to shed light on the cognitive skills of the study participants. The verbal responses to the think-aloud protocol in this study were classified into five problem-solving categories: task descriptions, instructions/questions to model, self-focus/self-talk, evaluative comments, and comments/questions to investigator. The content, as well as the amount, of the verbal reports

differed dramatically. All three subject groups responded to the strategies in the same rank order (as listed above). However, sometimes there is more to what is said than how often it is said.

The novice and experienced non-expert responses closely paralleled each other throughout the study. Differences came in the comments/questions to the investigator. The comments from the novices were asking for clarification as well as apologizing for their performances. The experienced non-experts and the novices simply spoke with commands telling the model what to do. Self-focus/self-talk with these two groups was typically used in the beginning of the protocol to plan and prepare. It was also used to prevent stalling and collect their thoughts. Differences also occurred between the experienced non-experts and the novices here. The experienced non-experts tended to wander and get lost in their comments. They spent a great deal of time on tangents not related to the question. Most of their time off-task seemed to be spent justifying their beliefs and choices. This readily supports the work by Groen and Patel, 1991. The novices, on the other hand, had negative and harsh things to say about themselves. Both groups provided evaluative comments mainly at the end of the think-aloud protocol and appeared to be performing a final assessment of the task. They commented very broadly on things.

Task descriptions found the experts creating sport scenarios to place the model in so that they could better situate themselves and perform the protocols. With respect to instructions/questions to model, the experts had fun. They used light banter, referred to the model by name, and had a relaxed, playful encounter with the model. Rapport was very important to the experts. Experts used self-focus/self-talk ongoing throughout their dialogue. Their talk appeared to ground them and keep them on task. Butterfield, Slocum and Nelson (1993) evidenced this as well. Admittance of mistakes and humorous comments came forth. A

constant check and balance seemed to be played out with the experts. Evaluative comments were ongoing through the experts' dialogue. They tended to evaluate both their performance and their choice of statements.

According to the literature on problem solving in novices (Chi, Fletovich & Glaser, 1981; Mayer, 1988), novice subjects attempt to problem solve strictly based on the problem statement itself. This study supported these findings. In most cases, the novices found the task at hand to be the only component to be explored or addressed. The problem statement was itself the problem to be solved. This approach to problem solving found the novices employing a means-end strategy, or heuristic (Delaney, Ericsson & Knowles, 2004).

The experienced non-experts in this study displayed a tendency to drift in their protocols and brought forth a fair amount of unnecessary information. This was corroborated by previous work from Groen and Patel (1991). The ENE's appeared to have an insecure grip on their knowledge and what to do with it. The problem solving strategy typically displayed by the experienced non-experts in this study was a combination of means-end and subgoaling strategies.

The experts displayed great abilities to both identify and address problems in this study. Strategies employed by the experts tended to vary depending on the problem at hand (Chi, Feltovich & Glaser, 1991). At times, the experts displayed the use of schemes, while also relying upon forward reasoning. With the simpler tasks to be solved, the experts even displayed means-end heuristics. Remembering that Ericsson (2003) stated that emerging as a true expert is not a function void of cognitive action, but an ability to harness the requisite knowledge and experience most efficiently, these subjects clearly demonstrated their ability as experts.

Learning Units

In order to fully understand what learning has occurred, identifying learning units or concepts is paramount (Butterfield, Slocum & Nelson, 1993). In this study, many questions arose as the identification of such learning units proved quite fascinating. The challenge for these subjects did not exist in identifying the units. The challenge arose in finding agreement on the identified units. Basically, no subjects could agree on common learning units for the questions used in this study. Neither the novices nor the experienced non-experts had any units in common for any of the study questions. The experts in the collegiate setting found commonality on one question with one learning unit. Program A received poor representation by its novices. Twice answers were given reflecting a lack of instruction of specific units. To further this compounding instructional crisis, both students agreed that one question had not been formally taught in their program of study. The ENE's from Program A identified 13 common units, while ENE's from Program C identified two. Collegiate ENE's expressed seven common units and the clinical/industrial/corporate ENE's expressed six common units. In spite of sharing so many common learning units, the issue of quantity versus quality arose when looking to the ENE's from Program A. Just because the instructors could agree on what units might belong in the curriculum did not always translate into what units should belong in the curriculum. An agreement on teaching the same within a program might not be an agreement on teaching the best within a program. Even more important, when educators cannot agree on what the learning units are how can they be expected to properly implement and appropriately teach these mysterious units in their curriculum?

Surprisingly, the novices averaged the fewest number of identified learning units. One would have thought that the novices would be able to identify more learning units simply because they had recently graduated from their competency- and proficiency-based curriculums. Learning units, presumably, would still be imbedded in their minds. Interestingly, the experienced non-experts identified on average more learning units than the experts did. In examining the learning units identified by the professional setting in which the subjects primarily worked, the academicians found, on average, the most learning units followed by the collegiate ACI's and then the clinical/industrial/corporate ACI's. All of this, so far, falls in line with current thinking. One would assume that full-time professors/instructors would be able to identify the greatest amount of learning units because they are entrenched in these matters everyday. In comparing the ENE's from Program A to Program C, the ENE's from Program A averaged 44 identified learning units, while the ENE's from Program C averaged 22 learning units. Again, more is not always better. There has to be something said for deliberate, systematic approaches to instructional planning.

Themes Emerging from the Learning Units

The themes that emerged clearly showed differences between the novices and the experienced non-experts and the experts. For the first three study questions, two categories were used to describe the learning units – physical performance and knowledge of performance. Overall, both the novices and the experienced non-experts listed more units that fell in the physical performance category than in the knowledge of performance category. The experts, on the other hand, listed more learning units that were categorized as knowledge of performance

than physical performance. The experts showed a greater concern for higher-level cognitive tasks than the mere physical performance of these three tasks. Bereiter and Scardamalia (1993) also found in their studies that experts demonstrated a higher propensity for dealing with difficult problems, while ENE's preferred familiar things and the novices avoided challenges.

Study question number four was different. The results of this question supported Ericsson and Simons' work (1993). They found that, in essence, a persons' knowledge dictated their performance. Six categories were used to define the emerging themes with this question. The experienced non-experts and the novices' listed the greatest number of units in the inflammatory/healing cycle theme. Therapeutic exercise was the category where the greatest amount of the expert units clumped. The experts put the least emphasis on modalities, while the experienced non-expert put the least emphasis on communication and the novice placed the least emphasis on therapeutic exercise. This stands to reason. As the athletic trainer becomes more seasoned, the greatest challenge shifts to that of most effectively and most efficiently returning the athlete back to play. The typical skill set that will flourish under these constraints was expertise in therapeutic exercise. Simply acquiring an astute awareness of the injury/healing cycle was the greatest concern for fledgling athletic trainers. They must fully understand the acute phase of an injury in order to properly treat and triage these injuries. Their knowledge was still keenly focused on textbook knowledge versus practical, real-world knowledge.

Program Demographics

Most often, people look at the descriptive details of their lives and tend not to see meaning in the numbers. If, however, one looks close enough, there is usually an incredible

story waiting to be told. This was definitely true when it came to the demographics of each of the three programs involved in this study. A popular marketing scheme today is that bigger is better! When dealing with a person's education and their life, this can no longer ring true. Program A, the largest program in this study (in all demographic categories) unfortunately presented with some of the most glaring instructional mishaps. Both novices from Program A reported that they did not remember some of the questions from this study being addressed in their curriculum. Now, the concern lies in how this was allowed to happen. Cummings and Boote (2003) found that the intended curriculum of undergraduate athletic training programs did not always match the actual curriculum. With almost all of their ACI's and clinical sites located off-campus, there lies a supposition that a lack of communication and/or institutional control with these outlying educators may have contributed to this problem. Another interesting thing to note about Program A was that they did not have an expert in the study, on their faculty, or on their campus for immediate student, or faculty, access to expertise.

Program B can be considered the program in the middle. Their entire demographics fell somewhere between those of Program A and Program C. This program, also, had a negative report by a novice in the study. The novice claimed that two questions were not taught in the curriculum. Due to the healthy number of ACI's and clinical sites, and the fact that every person in the study and every faculty position in their program was filled by an expert, one would have to argue strongly that it was not an issue of programmatic control. In this situation, from the comments made by the novice, one is forced to look in-house. Instructional strategies, or inappropriate strategies, appeared to be the culprit in this situation. Somehow, the instructor and the student did not connect on this topic because the other students from this program did not make any comments of this nature.

Program C, the smallest, most intimate program, received no questionable comments from the any of the novices. This program even had the largest novice population in the study. It appears that the balance found amongst the educational staff, the ACI's and the students in Program C was a very healthy and successful one.

Study Limitations

Several limitations did evolve as this study progressed. These limitations should be considered and addressed in order to understand future implications for the field and to pursue potential research studies to follow this one. These limitations included:

1. no inter-rater reliability, thus presenting possible researcher bias,
2. this was an exploratory study utilizing a think-aloud protocol,
3. site selection involved known persons and subject selection was performed by each Program Director, all based on availability and willingness to participate in this study.

One of the main concerns in qualitative research is the ability to generalize the findings of studies to other similar entities. The desire to discover interesting findings and apply these findings outside one's own limited scope, and to positively impact others is a driving force for some qualitative researchers. In light of this, though, qualitative researchers are forced to question the heart of generalizing by the words penned by Schofield (1990). Schofield addresses this matter with a simple question that seems to dangle before us and produce even more questions: what do we really want to generalize our findings to?

Recommendations for Further Research

Further study is needed in the pedagogical and instructional strategies being used in undergraduate athletic training educational programs around this country. The groundwork has now been put in place. This challenge of improvement has only begun. The tip of the iceberg has just felt its first scratch. Curricular issues in these programs are widespread and have a tremendous potential to both positively and negatively impact our profession. Athletic training educators now must launch forward, undaunted by the enormity this challenge presents. In order to truly identify and assess areas of opportunity, we must continue down the path that those before us have blazed.

Further research is warranted based on the findings of this study. It is no longer good enough to simply know that quantity of instruction and quality of instruction are not the same thing. It is no longer good enough to be consistent within the program, yet not meet the needs of the students. Students cannot graduate from academic programs and not remember major portions of the curriculum being taught. Now that it is known where students are (and are not) learning skills in the curriculum, and now that it is known what instructional methods are of most worth to these students, how do athletic training educators best implement this knowledge and better teach these students? How can a curriculum be created that affords the best instructional strategies for every student? How can a curriculum be designed to best capture what is now known to be "of most worth" to these students? How can educators come to an accord on what the learning units are for certain tasks? Until there is agreement amongst athletic training educators, how does one best teach what? A consensus must be reached on what should be taught before attempting to figure out how one could teach it better. Most importantly, though,

more expert-novice studies should be done to not just identify the differences between expert and novice athletic trainers, but to identify appropriate pedagogical and instructional strategies to help propel these novices towards their own levels of expertise.

Theoretical grounding was provided in this study establishing differences in the self-efficacy between the experienced non-experts and the experts. Levels of self-efficacy appeared to marry with the efforts and responses that the subjects provided. Subjects that appeared to demonstrate high levels of self-efficacy (mostly experts) tended to boldly, yet comfortably, and accurately answer the study questions. This alone, seemed on target. However, other subjects who appeared to have a disproportionate level of self-efficacy (mostly experienced non-experts) attempted to answer in the same fashion as the experts, but failed to achieve the same end results. Further research in this area is warranted to establish the effects of realistic and unrealistic levels of self-efficacy and its impact on problem solving in athletic trainers.

Also, exploration into Vygotsky's self-talk theory could prove useful in examining the differences in self-talk between the subject groups. Individuals confronted with a difficult task tend to transfer their speech externally, thus attempting to restructure, guide and/or plan their response to the task. Some subjects obviously found certain tasks to be challenging and others did not, as evidenced by their external private speech.

Summary

The purpose of this study was two-fold. First, to come away with a better understanding of the instructional practices in undergraduate athletic training education programs and be able to determine "what instructional methods are of most worth" was of great concern. Also,

identifying the problem solving strategies used by novice, experienced non-expert and expert athletic trainers was desired. This study accomplished both goals it set out to pursue. The aftermath, though, was a little unexpected.

This study helped support the well-respected teaching notion of "first teach them, then show them, then have them do it". The findings demonstrated that this was definitely what appeared to be occurring in these programs. On first contact, students were taught via lecture in the classrooms. When attempting to understand concepts, undergraduate athletic training students preferred to be taught with interactive, hands-on methods in the clinical settings and labs. This was perceived to be the "method of most worth" to these students. At the same time, the fact that nobody could agree on what the learning units were, or presumably should be, was alarming. Not agreeing on learning units correlates to not agreeing on the curriculum.

Expert athletic trainers were on an ongoing journey of self-evaluation. They thrived in relaxed, intimate relationships and treasured their rapport with others. Humor played a large part in their ability to handle the stresses of their job requirements. Simulations were frequently used to better grasp and define situations around them. Often, they openly admitted mistakes and used a constant check and balance system to process their success and growth. Experienced non-expert and novice athletic trainers focused mainly on tasks and commands - things. Self-evaluation appeared to be neglected, or maybe not yet known. Experienced non-experts tended to spend a great deal of their time attempting to justify who they were and why they did certain things, instead of simply excelling at who they were and what they knew. Novice athletic trainers sought constant clarification and validation of their work. They also spent an unfortunate amount of time apologizing for their actions and words. Bereiter and Scardamalia (1993) keep

us grounded by reminding us of the fact that expert-novice studies truly only reveal how capable people are of responding to a task at any specific moment in time.

In most cases, the novices employed a means-end strategy, or heuristic. The experienced non-experts utilized a combination of means-end and subgoaling heuristics. The experts displayed the use of schemes, forward reasoning, and even means-end heuristics with simpler tasks.

Program A helped us to understand many things. First, quantity versus quality in education is a very fine line to walk. One winds up paying a dear price for drifting off course. Second, the number of learning units one teaches does not, nor can it ever, equate to the quality with which one teaches. Program A also helped demonstrate that sometimes the bigger you get, the more out of control you get. There is a point of no return where your program (both in student and staff numbers) can outgrow your ability to service your constituents. The necessity, not just the nicety, of having immediate access to experts shines brightly through this program as well. Program C quietly showed us that the key to success in all of this seems to lie in having healthy numbers and healthy relationships with all members that comprise your program.

I close with words that move me, inspire me and drive me. "No scientific discovery is ever complete. No experience is ever finished or exhausted. This is the beauty of knowledge and discovery. It keeps us forever awake, alive and connected with what is and with what matters in life." (Moustakas, 1994). With this, may the overarching question facing numerous undergraduate athletic training educators today become less of a daunting challenge. May we now move forward in designing research studies to properly answer this question and leave the anecdotal rhetoric behind. Where and how *is* the disconnect between classroom teaching and clinical instruction occurring?

APPENDIX A
UCF IRB FORM FOR HUMAN SUBJECTS

University of Central Florida

Office of Research

May 9, 2004

Nancy Cummings
436 Pineview Street
Altamonte Springs, FL 32701

Dear Ms. Cummings:

With reference to your protocol entitled, "Instructional Practices in Athletic Training Education Programs: "What Methods are of Most Worth?" I am enclosing for your records the approved, executed document of the UCFIRB Form you had submitted to our office.

Please be advised that this approval is given for one year. Should there be any addendums or administrative changes to the already approved protocol, they must also be submitted to the Board. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Further, should there be a need to extend this protocol, a renewal form must be submitted for approval at least one month prior to the anniversary date of the most recent approval and is the responsibility of the investigator (UCF).

Should you have any questions, please do not hesitate to call me at 823-2901.

Please accept our best wishes for the success of your endeavors.

Cordially,

Chris Grayson
Institutional Review Board (IRB)

Copies: Dr. Dave Boote
IRB File

12443 Research Parkway • Suite 207 • Orlando, FL 32826-3252 • 407-823-3778 • Fax 407-823-3299

Revised 11/03

THE UNIVERSITY OF CENTRAL FLORIDA
INSTITUTIONAL REVIEW BOARD (IRB)

IRB Committee Approval Form

PRINCIPAL INVESTIGATOR(S): Nancy Cummings

PROJECT TITLE: Instructional Practices in Athletic Training Education Programs: "What Methods are of most Worth?

Committee Members:

Dr. Theodore Angelopoulos: _____
Ms. Sandra Browdy: _____
Dr. Jacqui Byers: _____
Dr. Ratna Chakrabarti: _____
Dr. Karen Dennis: _____
Dr. Barbara Fritzsche: _____
Dr. Robert Kennedy: _____
Dr. Gene Lee: _____
Ms. Gail McKinney: _____
Dr. Debra Reinhart: _____
Dr. Valerie Sims: _____

[ ] Contingent Approval
Dated: _____

[ ] Final Approval
Dated: _____

[X] Expedited
Dated: 3 May 2004

[ ] Exempt
Dated: _____

Chair, IRB
Signed: _____
Dr. Sophia Dziegielewski

NOTES FROM IRB CHAIR (IF APPLICABLE): PI needs to indicate that permission will be obtained.

APPENDIX B
SUPPLIES NEEDED

- video camera
- tripod
- tapes
- TV/VCR
- VCR VHS adapter
- examination table for model
- table and chair for researcher
- dry erase board, markers, and eraser
- ice bags
- ice in ice cooler
- ace wraps of various sizes
- white athletic tape in various sizes
- prewrap
- conform or other elastic tape
- goniometers or other ROM devices
- site-specific LB ROM measurement tools
- undergraduate Athletic Training program of study
- program demographics
- program history
- program NATA scores

APPENDIX C
STUDY PROTOCOL

1. subject enters room
2. explanation of study is provided by the researcher
3. consent waiver forms are signed
4. subject is shown the room set-up and supplies
5. subject is introduced to the model
6. subjects' questions are addressed
7. study commences
8. two (2) sample tasks and four (4) main tasks are addressed
9. video footage is re-wound and prepared for review
10. subject performs stimulated video recall with researcher documenting comments
11. prompts are asked by researcher to ascertain the teaching and instruction of specific skills and knowledge within the program

(* Each protocol session should last approximately 90 minutes.)

APPENDIX D
STUDY QUESTIONS FOR VIDEO STIMULATED RECALL SESSION

Sample questions:

1. Apply an ice bag to the model who just sustained a right thigh contusion. Assume that the contusion is located in the distal quadriceps region.
2. Apply buddy taping to the left middle finger.

Main questions:

1. Perform a Lachman's test; right side is involved.
2. Perform a tape job to prevent left elbow hyperextension.
3. Test for low back range of motion.
4. Design a return-to-play rehabilitation program for a female basketball player who sustained a Grade 1 inversion ankle sprain in practice this morning. Her next game is in five days. Use the board to design the rehabilitation program.

APPENDIX E
NOVICE THINK-ALOUD PROTOCOL INSTRUCTIONS

Sample questions:

"In this study I am interested in what you are thinking as you find the answers to questions that I am going to ask you. In order to do this, I am going to ask you to "THINK ALOUD" as you work on the task at hand. What I mean by think aloud is that I want you to tell me EVERYTHING that you are thinking and doing from the time you first hear the question until you have completed your answer. I would like you to talk aloud CONSTANTLY from the time you hear the question until you feel that you have completed your answer. I do not want you to feel as if you have to plan what you are going to say or that you have to explain what you have said. Act as if I am not in the room and you are here speaking out loud and working on the questions by yourself. The model is here merely to assist you in your ability to best answer the question. It is important that you keep talking at all times. If you are silent for a length of time, I will prompt you to keep talking. Do you understand what I have asked of you?

Good. Now let's begin by practicing on a sample question. Remember to think aloud as you answer the question. Tell me everything that you are thinking and doing from the moment you first hear the question. Apply an ice bag to the model who has just sustained a right thigh contusion. Assume that the contusion is located in the distal quadriceps region.

Good. Next, I want you to address your sample question number two. Remember to think aloud as you answer the question. Tell me everything that you are thinking and doing from the moment you first hear the question. Apply buddy taping to the left middle finger."

Main questions:

"Good. Now we are ready to move onto the four main questions for this research study. During these questions, you will continue to use the same protocol as you did for your two

sample questions. Remember to think aloud as you answer the question. Tell me everything that you are thinking and doing from the moment you first hear and see the question.

- Question number one: Perform a Lachman's test; right side is the involved side.
- Question number two: Perform a tape job to prevent left elbow hyperextension.
- Question number three: Test for low back range of motion.
- Question number four: Design a return-to-play rehabilitation program for a female basketball player who sustained a Grade 1 inversion ankle sprain this morning. Her next game is in five days. Use the board to design the rehabilitation program."

Recall:

"During this stimulated video recall session, I am going to ask that you review your VERBAL COMMENTS. I want you to focus on what you SAID as you were answering the four main questions. The purpose of this recall session is to attempt to identify where in your program of study you first learned certain tasks and how you were taught these tasks. As you watch the recall session, feel free to break each of the four main questions into smaller learning units, if you feel it is appropriate.

Finally, I would like for you to identify when and how this learning unit was BEST taught to you. You may find that your answers to these recall questions may be the same of they may be different. There is no right or wrong answer. Do you understand what I have asked of you?

Good. Remember as you review your verbal comments identify the various learning tasks or units. Then, tell me where you first learned that learning task or unit and how it was first taught to you. Next, inform me of where and how you think you best learned the task or unit. Let's begin with main question number one: the Lachman's test.

Good. Remember as you review your verbal comments identify the various learning tasks or units. Then, tell me where you first learned that learning task or unit and how it was first taught to you. Next, inform me of where and how you think you best learned the task or unit. Now, let's proceed to main question number two: the elbow hyperextension tape job.

Good. Remember as you review your verbal comments identify the various learning tasks or units. Then, tell me where you first learned that learning task or unit and how it was first taught to you. Next, inform me of where and how you think you best learned the task or unit. Now, let's proceed to main question number three: low back range of motion.

Good. Remember as you review your verbal comments identify the various learning tasks or units. Then, tell me where you first learned that learning task or unit and how it was first taught to you. Next, inform me of where and how you think you best learned the task or unit. Now, let's proceed to the final main question: the ankle rehabilitation program. Good. Do you have any questions regarding your responses or this study?"

APPENDIX F
EXPERIENCED NON-EXPERT AND EXPERT THINK ALOUD PROTOCOL INSTRUCTIONS

Sample questions:

"In this study I am interested in what you are thinking as you find the answers to questions that I am going to ask you. In order to do this, I am going to ask you to "THINK ALOUD" as you work on the task at hand. What I mean by think aloud is that I want you to tell me EVERYTHING that you are thinking and doing from the time you first hear the question until you have completed your answer. I would like you to talk aloud CONSTANTLY from the time you hear the question until you feel that you have completed your answer. I do not want you to feel as if you have to plan what you are going to say or that you have to explain what you have said. Act as if I am not in the room and you are here speaking out loud and working on the questions by yourself. The model is here merely to assist you in your ability to best answer the question. It is important that you keep talking at all times. If you are silent for a length of time, I will prompt you to keep talking. Do you understand what I have asked of you?

Good. Now let's begin by practicing on a sample question. Remember to think aloud as you answer the question. Tell me everything that you are thinking and doing from the moment you first hear the question. Apply an ice bag to the model who has just sustained a right thigh contusion. Assume that the contusion is located in the distal quadriceps region.

Good. Next, I want you to address your sample question number two. Remember to think aloud as you answer the question. Tell me everything that you are thinking and doing from the moment you first hear the question. Apply buddy taping to the left middle finger."

Main questions:

"Good. Now we are ready to move onto the four main questions for this research study. During these questions, you will continue to use the same protocol as you did for your two

sample questions. Remember to think aloud as you answer the question. Tell me everything that you are thinking and doing from the moment you first hear and see the question.

- Question number one: Perform a Lachman's test; right side is the involved side.
- Question number two: Perform a tape job to prevent left elbow hyperextension.
- Question number three: Test for low back range of motion.
- Question number four: Design a return-to-play rehabilitation program for a female basketball player who sustained a Grade 1 inversion ankle sprain this morning. Her next game is in five days. Use the board to design the rehabilitation program."

Recall:

"During this stimulated video recall session, I am going to ask that you review your VERBAL COMMENTS. I want you to focus on what you SAID as you were performing the four main questions. The purpose of this recall session is to break each of the four main questions into smaller learning units, if you feel it is appropriate. There is no right or wrong answer. Do you understand what I have asked of you?

Good. Remember as you review your verbal comments identify the various learning tasks or units. Let's begin with main question number one: the Lachman's test.

Good. Remember as you review your verbal comments identify the various learning tasks or units. Now, let's proceed to main question number two: the elbow hyperextension tape job.

Good. Remember as you review your verbal comments identify the various learning tasks or units. Now, let's proceed to main question number three: low back range of motion.

Good. Remember as you review your verbal comments identify the various learning tasks or units. Now, let's proceed to the final main question: the ankle rehabilitation program. Good. Do you have any questions regarding your responses or this study?"

APPENDIX G
SAMPLE PROGRAM LETTER OF REQUEST AND AGREEMENT TO PARTICIPATE

To: CAAHEP Undergraduate Athletic Training Education Program Directors
From: Nancy H. Cummings, Doctoral Candidate, ATC/L, CSCS
Date: June 6, 2004

RE: Dissertation study titled: "Instructional practices in athletic training education programs: What methods are of most worth?"

Dear ____,

Thank you so much for agreeing to allow your undergraduate athletic training educational program to participate in my dissertation study. By providing both students and ACI's for my use, you will be involved in a study that will definitely provide valuable information to our profession and educational programs. I appreciate the time and interest you have already shown in your commitment to this study.

I am including a list of items below that I am asking to "borrow" from your programs while I am on your campus. Due to the nature of this study, it would prove difficult for me to travel with these supplies. In order to keep it fair for all programs, I am asking for your cooperation in donating these supplies. If this proves impossible for your program, I will reimburse any supplies used during the duration of the study while on your campus.

I have also included a form letter that must be signed by each program director. For your ease, I have drafted the form so that you can simply copy and paste it onto your program letterhead. Also, a sheet requesting information on demographics specific to your program is included. Please have these forms signed and ready for me to file upon my arrival to your campus.

In order to keep the study free from bias, I will be requiring a room that can be kept private (i.e.: door closed and window treatments shut). It is necessary that there be no way for the participants to know in advance what they are going to be asked to do. If this can be arranged, it would be appreciated.

Again, I am so grateful for your participation in my dissertation study. Please see the forms/information below for the agreement to participate and the specifics on the program demographics.

Thank you!

Nancy H. Cummings, Doctoral Candidate, University of Central Florida

Letter of Agreement to Participate in Doctoral Dissertation Study

This letter is confirmation that I, as Program Director of the undergraduate Athletic Training Program at _____, willfully agree to allow both students and Approved Clinical Instructor's from my program to participate in the Doctoral Dissertation study being performed by Nancy H. Cummings. Nancy is a Doctoral Candidate at the University of Central Florida. The dissertation study is titled: "Instructional practices in athletic training education programs: What methods are of most worth?"

Printed Name: _____

Signature: _____

Program: _____

Date: _____

APPENDIX H
SAMPLE PROGRAM DEMOGRAPHICS FORM

Undergraduate Athletic Training Program Demographics

Length of academic program (2, 3, 4 years): _____

Total number of students enrolled in program: _____

Number of graduating seniors this year: _____

Class GPA: _____

Average class GPA: _____

Number of males in program: _____

Number of females in program: _____

Number of clinical sites: _____

Number of ACI's: _____

Number of tenured faculty members: _____

Number of adjunct faculty members: _____

Any other information you may want to include:

APPENDIX I
SAMPLE INFORMED CONSENT PROCESS / FORM

Informed Consent Process / Form

April 23, 2004

Dear Athletic Training Student and/or Approved Clinical Instructor:

I am a doctoral student at the University of Central Florida. I am conducting a research study as part of my dissertation. The purpose of the study is to better understand the instructional practices being used in clinical education settings in undergraduate athletic training programs.

You have been chosen because you are a senior-level student in a CAAHEP accredited undergraduate program, or you are an Approved Clinical Instructor for a CAAHEP accredited program. If you agree to participate, you will be asked to participate in a video recorded practical simulation. All questions will seek to better understand the instructional practices in your undergraduate athletic training educational program, specifically the clinical experiences. You will not have to answer any questions or perform any practical tasks that you do not wish to and may end the session at any time. Your total time commitment is 60 minutes.

Your session will be conducted in-person with a model at your disposal to better demonstrate and perform certain tasks. With your permission, I would like to video tape the practical tasks. Only I will have access to the video tape which I will personally transcribe and then erase. During the transcription process, I will remove any information that might allow you to be identified and your identity will be kept confidential. Your identity will not be revealed at any point in the research or final manuscript.

There are no anticipated risks, compensation, or other direct benefits to you as a participant in this study. You are free to withdraw your consent to participate and may discontinue your participation in the study at any time without consequence.

If you have any questions about this research study, please contact me at 436 Pineview Street, Altamonte Springs, Florida 32701. My telephone number is (407) 834-0760. My dissertation advisor is Dr. Dave Boote. Questions or concerns about research participants' rights may be directed to the UCFIRB office, University of Central Florida Office of Research, Orlando Tech Center, 12443 Research Parkway, Suite 207, Orlando, Florida 32826. The telephone number is (407) 823-2901.

If you agree to voluntarily participate, please sign this form. A second copy is provided for your records. By signing this form, you give me permission to report your responses confidentially in the final manuscript.

Sincerely,

Nancy H. Cummings, M.Ed.

_____ I have read the procedure described above.

_____ I voluntarily agree to participate in this study and have received a copy of this form.

_____ I would like to receive a copy of the final "practical" manuscripts.

_____ I would not like to receive a copy of the final "practical" manuscripts.

_____/_____
Participant date

_____/_____
Principal Investigator date

Title of study: Instructional practices in athletic training education programs: "What methods are of most worth?"

APPENDIX J
SAMPLE TRANSCRIPTION

"Instructional practices in athletic training education programs:
What methods are of most worth?"

Name: ENE 2 School: A

Novice: Experienced Non-Expert: X Expert:

Task	Verbal Comments
MT #1	I would notice the scar on his knee. And notice that it it looks like he's already had an ACL. I would probably ask how long it's been since he had one. Um, lay back on your back for me. I'm going to place him in proper patient positioning. So that he is in the most relaxed position. I'm gonna grab your right leg. I'm gonna ask him to relax his hamstrings and make sure his quads are nice and loose. Place my hand so that I have um a good grip on the femur to apply good stabilization. Place my other hand around the tibia so that I have my thumb around the tibial plateau. And as I apply force I'm gonna to apply an anterior translation to make sure that I am checking the ACL. He does have an end feel. He does seem to be a little bit lax. And I would do a bilateral comparison to see the difference between the two.
MT #2	Okay. I'm gonna have you sit up for me. Grab the supplies I need. White tape, prewrap, plexi wrap. Um, I'm gonna have you sit down and swing over here. Okay, I'm going to place his elbow with a significant bend in it so that I'm going to be preventing elbow hyperextension. Okay. I'm gonna have you ask you to hold it in that position for me. Okay? Um, you can do it one of two ways: apply pre-wrap or have them shave and apply it directly to their skin. Um, we don't have heel and lace pads, but I could put heel and lace pads over the cubital fossa to prevent any friction or blisters. And I'm gonna start up at the top of the biceps and go mid-way down to the forearm. Okay. I'm gonna apply my anchors. I'm gonna apply slightly onto the skin to prevent... I would use tuff-skin cuz it will allow the tape to sit a little bit better and not slide. Make a muscle contraction for me so that. Just don't move your arm, just make a muscle that way I don't make it too tight and it will cut off your circulation. Okay? I'm gonna apply a couple of anchors. And I'm gonna apply those anchors both proximal and distal. So, again I'm gonna ask you just to squeeze your fist and squeeze your forearm so I don't make it too tight. And I'm just overlaying my tape by about half so there is no gapping. Okay. Now I'm gonna make my X's to prevent him from being able to um extend the arm. And you measure it basically just like this so it will lie completely across from one side of the anchors to the other. Then I'm gonna do it on the table first just cuz it tends to be a little easier. And then I will apply it. So, again I'm gonna make sure that I'm overlaying it one on top of the other. So I don't have any gapping and it's a nice strong tight X to prevent that extension. (can you talk louder, please?) Now that I've got it all laid out, pull it off the table, and I'm gonna make sure that he's in the proper position in order to lay the X

down. Try and pull out wrinkles. And I'm then gonna pull it so that it's nice and tight. And lay it at the top. And I'm gonna I'm just holding both ends. Just lay down. And I'm gonna try to extend him and make sure I prevented that. And then I'm just gonna again ask him to squeeze his biceps and anchor it down again. so that it doesn't move anywhere. And then end at the distal end. Check it one last time; he cannot be in extension. And then I would just do an overlay of power flex because when he's participating someone can come in and grab that. So to prevent anyone from catching and hooking him, I'll just put a light layer of power flex around the elbow. Secure that. And my final step would just to be to make sure that he's got good capillary refill.

MT #3 Okay. Test for LB ROM. It doesn't specify whether you want a goniometric measurement. Um, so, I'm just assuming you want. Um, we can do goniometric measurements. We can test normal ROM just based on what I can see. I'm gonna ask you to stand up for me. First thing I'm gonna do is just watch his posture and just make sure that he's got good posture. Ask him if he's got any sort of deficiencies or if he's just hurt his back. Um, if this is the case, if this is not the case and he's just um a normal athlete, I'm just gonna ask him can you bend down and touch your toes, see how far you can go. See what his active ROM is. Okay, if there's any limitations, then usually you test it passively ROM. I'm gonna ask him to put a hand on either side and step um to make sure that um that everything's that um shoulder width apart. Arm on each side and side bend. In each direction. Okay. And then place your hands on your hips right over your iliac crest. And I'm just gonna ask that you step back. As far as you can go. Good, and come back up. Um, usually when you have a deficiency with AROM that's when I would passively do the same motions with him. You can measure them with goniometric measures, um a goniometer, um you can measure them with a bubble inclinometer and you can also measure them with a tape measure. If you're going to measure with a goniometer, I'm gonna lay lay the um goniometer going the direct axis of movement will be directly in the center of the goniometer. Stationary arm straight down the leg. Movement arm directly up the middle of the thorax. And I'm gonna ask him again to make sure that he bends down and touches his toes. Keeping the stationary arm and allowing the movement arm to move with him. And back up. You got about 10 degrees of forward flexion. Um, again, like I said, you can do it with um a tape measure as well. Um same thing. I'm going to ask him to do extension. Go ahead and go backwards. And you got 20 degrees there. And for lateral flexion in either direction you can do it a couple of different ways. You can measure the difference of the fingers from where he initially starts to where he ends and measure the measurement there. Or you can, step forward for me please. Again with the goniometer same side up whereas the movement side will go directly up the spinous processes of the back. Um, axis of rotation, can I have you step this way? Axis of rotation will be directly through the center of where he's moving and the stationary arm will be directed down. Again make sure your feet are shoulder width apart just so you're comfortable; arms are down on either side. Stand up straight please. Okay. And go ahead and

move towards your right. You got about 11 degrees that way. And then to your left. And about 10 that way. Measured it quick, quickly.

MT #4 I'm just re-reading the question to make sure I have all the parameters proper. (reads question out loud) I'm just gonna write down the parameters just to make sure that I don't make sure that I don't forget anything. Grade 1 inversion. Okay. Um, I'm gonna now write down each of the phases of the rehab program. Acute phase which will be immediately after. Um, what I'll do is I'll get them into the training room. I'll probably do a thorough evaluation. To confirm my clinical impression. After I've confirmed it and I know that it is a grade 1 inversion ankle sprain and I know I'm not positive I know there is no fracture or dislocations or anything um, a little bit more in depth. Then initially what I'll do is I'll get them in a cold whirlpool for 15 minutes. Um, after they get out of the cold whirlpool I'm then going to do prone massage. And I'm going to do that to push out all the extra edema and inflammation. Do you want me to write all that down here? Prone massage, than I would put them back in a cold whirlpool. This time I would try and get them doing some cryokinetics which they're beginning to do a little bit of ROM activity with ABC's um, which they draw those with their toes to begin ROM activities. Um, hopefully after getting inflammation and edema out of the area out of the joint space, they're able to accomplish a little bit better. Um, after that this being day 1 I'd probably put them send them home. I'd probably give them a pair of crutches just because I want them playing in 5 days. So, I want them to be non-weight bearing for as much as possible. Um, not saying that they are incapacitated. But just to try to get them active quicker. So, I'm gonna give them crutches. I'm gonna put them in a compression sock or some sort of compression ace wrap, tape job, whatever. So give them compression, along with medial and lateral horseshoe around the joint space to prevent inflammation from returning back to that area now that I have just removed it. and, um I am also going to send them home with some sort of cryotherapy whether it be a cryocuff, ice a cooler of ice with ice bags, or some sort of way that they can continue to ice throughout the night until they see me again the next morning. And I'm going to instruct them to make sure that they ice every our on the hour for at least 15 minutes to elevate their leg, keep their nose above their, their toes above their nose as much as possible and keep the compression wrap on except for when they shower. And after they shower, they need to put it right back on. And crutch, use the crutches throughout the day if they want to participate again. Um, once I know that edema edema has stabilized and I know that again that the evaluation has confirmed the injury, then I'm gonna move onto ROM and flexibility. At that point, I need to make sure that they have full AROM and um flexibility and that they're both being comparison bilaterally to the affected leg would be equal to that of the non-affected. And just by doing basic stretching activities gastroc stretches, soleus stretches, um, any sort of anterior tibialis stretches, inversion, eversion stretches. And um both you would start with gravity eliminated ROM activities. Move to gravity assisted, and eventually to against gravity. And this would be my progression both with ROM and with flexibility to make sure

that I ensure that they are they are getting able to begin some things as soon as possible and work towards doing um to against gravity activities as they will have to do in basketball. Once ROM and flexibility have been established and they have normal ROM's and flexibility I will move on to strength and endurance. And again this is gonna move in the same type of fashion – gravity eliminated, gravity assisted, against gravity um phases with strength and endurance I'm gonna make sure I'm working inversion, eversion, df, pf just as I do with the ROM and flexibility. As well as start to do D1 and D2 patterns, which are a little bit more functional patterns and what they're going to actually need to baby to be able to accomplish basketball. Um, you could do this through manual resistance, progressive resisted exercises such as therabands progressing from one color to another and lighter colors lighter resistance to more difficult. Um, you can do it through sand weights or cable columns, whatever. Whatever you can find. Once I know strength and endurance will be um similar you can cross train these two if if strength if you can't get anywhere with strength if you can't move somebody up to 2 pounds 3 pounds. Um you can continue with a lower weight just doing more reps cross training to the endurance aspect and eventually you should see some cross training in her gains in strength. Once this is achieved and this is the same bilaterally, a bilateral comparison from affected to non-affected, next what I'm going to do is proprioception and coordination. And these two are going to be working basically the nerve endings that have been injured in the body part. Um I'm gonna proprioception is just basically retraining your kinesthetic awareness, where the body is in space and understanding balance. And then coordination is putting multiple activities together and still doing the same thing um training for kinesthetic awareness in space in those nerve endings. Once I feel that this is up to where they need it to be, then I'm going to place these 2 in the next phase which is agilities and plyometrics. Agilities being your taking your coordination and proprioception that you've now achieved and making your body move a little bit more efficiently and effectively since the fact that you have this injury and being able to do quick changes of direction um reaction time type drills. All things that are very um evident for you to need in basketball. Plyometrics is more of your power type training when you're working on explosive movements both um explosive acceleration or deceleration, or negative acceleration however you want to term it. um and doing your power and really training your power here. After these two are now achieved, then you're really gonna focus on your functional activities. And with this you're really gonna start doing your sport specific activities as your actual cutting drills, your rebounding, your dribbling skills. And really putting the basketball skills into your rehab phase of the athlete is gonna gain confidence in that injured body part and is eventually feel much more efficient as effective not really thinking much about the injury. Um, this should progress pretty quickly if you have an athlete who has a grade 1 inversion ankle sprain you should be able to do ROM, flexibility, start strength and endurance and probably proprioception and coordination within your first day. Um your primary focus is gonna be on strength and endurance to make sure the ankles are both um equal and so that person will not be favoring it causing over compensation and

eventually more injury. And then your agilities and plyometrics you can probably do the last 2 or 3 days. Um, yeah the last 2 or 3 days of the week just to make sure the athlete feels comfortable with that body part. Get them into practice, um full practice on the fourth day so that they feel 100% confident in the fifth day for the return to play.

APPENDIX K
SAMPLE LEARNING UNITS TRACKING FORM

"Instructional practices in athletic training education programs:
What methods are of most worth?"

Name: _____ School: _____

Novice: _____ Experienced Non-Expert: _____ Expert: _____

	Learning Units	Where first taught?	How first taught?	Where best taught?	How best taught?
Task #1					
Task #2					
Task #3					
Task #4					

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